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A Dual System Perspective of Time Orientation

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INTRODUCTION

One of the most frequent and important dilemmas people face in many aspects of their everyday life is the one between the present and future perspective. Focusing on the present is characterized mostly by the maximization of immediate benefits and disregard for future consequences, while a focus on the future entails forgoing immediate benefits and more long-term planning. Individuals face many trade-offs that require deciding on whether to focus on present vs future consequences. Spending resources to acquire immediate advantages vs saving for the future and possibly more difficult times, or even also using energy on reproducing now or waiting to develop and reproduce are some examples with different ramifications. The way people resolve such dilemmas is very important as it can have important consequences not only for individual lives but also for society in general. For instance, recent findings showed that cues orienting people towards the present made them less moral (Yam, Reynolds & Hirsh, 2014) and trusting (Petersen & Aaroe, 2015), but also more collaborative (Van den Bergh & Dewitte, 2006).

This difference in time orientation has been found to be very important for decisions taking place in economic settings. For example, present vs future orientation can have an impact on the willingness to pay for certain products and the type of products consumers choose (Wertenbroch, 1998; Read, Loewenstein & Kalyanaraman, 1999; Kivetz & Simonson, 2002), and in general on how individuals spend and invest their money (Hershfield et al., 2011). Research has already investigated the impact of time orientation on a wide variety of (economic) behaviors. However, some important behaviors that studies have pointed out to potentially be influenced by time orientation remain under-researched so far. Budget waste from choice inconsistency linked to time orientation is one example. Understanding how choice inconsistency leads to waste of budget is important in order to help individuals make better decisions. A second very important (economic) behavior potentially influenced by time

orientation is people's tendency to conform with social suggestions. Social norms have been used by numerous advertising campaigns as persuasion tools, and are fundamental in the economic fabric. Last, a third behavior that seems linked to time orientation is financial risk-seeking. Most of the financial decisions people make on a daily basis include a (small or large) risk factor. In the present dissertation we investigate the impact of time orientation on these three behaviors through the lens of several dualistic concepts which include the difference between present and future orientation in their framework.

Dual systems and time orientation

Some of the most widely used dualistic distinctions in science include the difference between present and future orientation in their framework. Scholars have very often interpreted history, society, economics and politics through the use of ''structural dyads'' or ''bipolar opposites'' (Bleiker, 2001). One of the first dualistic distinctions including the present vs future difference in its framework is the separation between human and animal mentality in philosophy. According to some philosophers, humans operate in two different modes, the animal mode which is capable only of associative and inductive reasoning and is characterized by satisfying more immediate needs on the one hand, and the human mode which is responsible of elaborated reasoning, deliberation and more long-term planning, on the other hand (Leibniz, 1989).

The short vs long-term focus distinction can also be found in economics. According to Thaler & Shefrin (1981), a person consists of two inner selves, a planner and a doer, at any point in time. The planner is responsible for long term/lifetime utility maximization whereas the doer exists only in the current period and is more myopic. The planner is responsible for the decisions which maximize long-term utility, whereas the doer is responsible for behaviors that are characterized by more immediate gratification. Both of the aforementioned dualistic

distinctions were primarily meant to describe, explain and predict phenomena related to loss of self-control.

One of the first behavioral scientists using a dualistic distinction including the difference between present and future focus was Freud. He argued that the human mind consists of two systems, a conscious and an unconscious one. Freud argued that these systems operate in different modes; the conscious mind operates in a logical mode and is responsible for the long-term planning while the unconscious mind operates in the associative mode and is responsible for satisfying more immediate urges. He also argued that the conscious mind does not have access to the content of the unconscious mind, and that the unconscious mind can be seen as a source of motivation and mental conflict (Freud, 1957). Since Freud, numerous behavioral studies have used some sort of dual system paradigm incorporating the difference between present and future focus to investigate and interpret psychological effects. Some of the most widely used behavioral theories are based on this dual system perspective: the dual-processing system, life-history strategies, behavioral inhibition and behavioral activation systems (BIS/BAS), self-control personality trait, and construal level theory, to name a few. All these systems have been found to have an impact on different aspects of individual's behavior that extend beyond the distinction between the present and the future.

In this dissertation we focus on three widely studied dual system distinctions, namely the dual-processing system, life-history strategies and mating tactics. All these systems include poles characterized by a certain time perspective. The one pole (intuitive judgments for dual-processing system, fast strategies for life-history strategies, and short-term tactics for mating tactics) is characterized by a focus on the presence while the other pole (cognitive judgments, slow strategies and long-term tactics, respectively) focuses on the future. We use these three dual systems to provide insights into some important and economically relevant behaviors: rational choice behavior, conformity and financial risk-taking. Literature suggests

that all these behaviors can be influenced by dualistic distinctions characterized by different time perspectives (see Thaler & Shefrin (1981) for rational choice behavior, Wheeler, Briñol & Hermann (2007) for conformity and Griskevicius et al. (2011) for financial risk-taking).

Dual-processing system

Some scholars consider the dual-processing system theory as one of the most important theoretical developments in the effort to understand human behavior (Dhar & Gorlin, 2013). The theory identifies two main reasoning processes, intuition and cognition (cf: Epstein, 1994; Sloman, 1996). This dichotomy has been used by numerous studies under different labels to refer to it, including (but not constrained to) nonverbal versus verbal processes (Paivio, 1986), associative versus rule-based system (Sloman, 1996), type I versus type II processes (Kahneman & Frederick, 2002), hot versus cold system (Metcalfe & Mischel, 1999), reflexive versus reflective system (Lieberman et al., 2002), and experiential versus rational system (Epstein, 1994, 2003). According to the dual-system theory, the human mind consists of an intuitive system, which is characterized by automatic, nonconscious and rapid reaction, and an evolutionarily newer cognitive system, which is characterized by slower, deliberate, conscious, and controlled reactions (Kahneman & Frederick, 2002). Intuitive processing operates mainly through associative memory and is responsible for more rapid and unconscious judgments. On the other hand, cognitive processing is used more for hypothetical thinking and the engagement of working memory.

The dual-processing reasoning framework has been widely applied to explain very diverse behavioral phenomena, such as judgments as diverse as probability estimates (Kahneman & Frederick, 2002), moral judgments (Haidt, 2007), self-control failures (Masicampo & Baumeister, 2008), pro-social behavior (Pitesa, Thau & Pillutla, 2013), preference consistency (Lee et al., 2009; Nordgren & Dijksterhuis, 2009) and choice biases

(Pocheptsova et al., 2009). In general, dual-processing system has been proven to be a very useful theoretical development with numerous implications, and it is expected to be used in a significant number of future endeavors (Dhar & Gorlin, 2013). In the present dissertation we investigate the impact of dual-processing system on budget waste coming from choice inconsistencies.

Life-history strategies

Life-history theory was developed to explain how and why organisms allocate time, resources, and energy among the various tasks necessary for survival and reproduction (Charnov, 1993; Daan & Tinbergen, 1997; Low, 2000). According to the life history framework, the fact that energy and resources are inherently limited makes all organisms face important trade-offs in how they use their resources throughout the course of their life. The amount of energy spent on body maintenance (e.g., immune system) cannot be spent on mate attraction (Kaplan & Gangestad, 2005; Roff, 2002). Therefore, at a given point in time, all organisms must choose between allocating resources on one versus another fitness relevant life component. For example, a fundamental trade-off all organism face is whether and when to invest in somatic versus reproductive effort (Hill, 1993). The amount of energy invested in growth and maintenance of the body and mind cannot be spent on reproductive effort (e.g. acquiring a mate, birth and childcare).

Life-history strategies vary along a fast-to-slow continuum according to the way in which individuals resolve the trade-off conflicts. In general, fast strategies are associated with earlier physiological and sexual development, a higher number of offspring, and reduced parental investment. Slow strategies are associated with later physiological and sexual development, a lower number of offspring, and greater parental investment (Ellis et al., 2009). Furthermore, research has found that the adoption of the different strategies has an impact on

a more behavioral level also. For instance, the adoption of fast strategies has been shown to lead to behaviors characterized by immediate gratification and risk-seeking, while the adoption of slow strategies was shown to lead to behaviors characterized by delay of gratification and less risk-seeking tendencies (Griskevicius et al., 2013).

Adoption of the different strategies depends on environmental factors such as harshness (e.g., mortality and morbidity), unpredictability (e.g., the consistency of harshness from one period to another), and resource scarcity (Ellis et al., 2009). Harsh environments lead to fast strategies while less harsh and unpredictable environments lead to slow strategies. For example, organisms living in harsh and unpredictable environments tend to invest less in somatic effort and more in reproduction. The impact of the environment is an important element of life-history theory. As a result, life-history theory has become a very useful tool for studies investigating the impact of resource scarcity and socioeconomic background on people's behavior (e.g. Griskevicius et al., 2011; Griskevicius et al., 2013). In essay 2, we use the concept of life-history strategies to investigate the effect of resource scarcity on conformity.

Mating Tactics

Mating tactics is an important topic of study in behavioral research as it focuses on a fundamental aspect of the life of humans, that is, mating alliances. All known human societies have formal mating alliances between men and women (Buss & Schmitt, 1993). The duration of a mating relationship is flexible; it can range from a few hours to several decades. Evolutionary theories on human mating argue that individuals have two main mating tactics: long- and short- term tactics (e.g. Buss & Schmitt, 1993; Gangestad & Simpson, 2000). This flexible mating design allows individuals to respond adaptively to a wide variety of circumstances. Males, generally, have benefited more than women from adopting short-term

mating tactics. A man mating with a significant number of women in a year would have more offspring than a woman doing the same. However, there is a considerable within-sex variation in preference for short- or long-term mating, as both men and women can be benefited by the different tactics (Schmitt, 2005).

The most prevalent theory explaining the reasons why humans adopt different mating tactics is the theory of strategic pluralism (Gangestad & Simpson, 2000). According to the theory, when local environments are harsh and demanding, the need for bi-parental care and long-term mating increases in order to better support infants' demands. Those environments, characterized by resource scarcity, low life expectancy, low birth weight and high child malnutrition are associated with the prevalence of long-term mating tactics. However, in less harsh and demanding environments, humans tend to adopt a more short-term oriented mating tactic.

Mating tactics have been found to have a highly significant impact on decisions directly associated with reproduction, for instance the choice of a partner. Individuals using short-term mating tactics tend to prefer more physically attractive partners, while individuals using more long-term mating tactics prefer more reliable partners (Simpson & Gangestad, 1992). Recent findings show that mating tactics can also influence decisions of a more economic nature which are not directly linked to reproduction. Durante & Arsena (2014) found that women employing short-term mating tactics selected more unique options from consumer product sets than women using more long-term mating tactics. Sundie and colleagues (2011) showed that short-term mating tactics led men to consume more high status products as opposed to long-term tactics. In essay three we use the mating tactics theory to explain why some people take less financial risks than others.

Overall Goal of the Dissertation

In this dissertation we investigate the behavioral outcomes of three important psychological dual systems which have as a common element the distinction between present and future orientation. In the first essay, we investigate the impact of the dual-processing system on budget waste coming from decision inconsistencies. We find that budget waste resulting from intuitive and cognitive judgments individually is comparable. However, after calculating overall budget waste across the two types of judgments we find a significant increase in budget waste. In the second essay, we investigate the impact of life-history strategies on conformity. We find that resource scarcity cues make people from a poor background (fast strategists) more conformist, while scarcity cues do not have an effect on people from a rich background (slow strategists). In the third essay, we test the effect of mating tactics on financial risk-taking. We find that salient mating goals drive people who adopt long-term tactics to become less risk-taking, while salient mating goals do not have an effect on people who adopt short-term strategies.

Introduction to Essay 1

A lot of research has linked economically irrational behavior to inconsistent choices triggered by the dual-processing system, often referred to as intuitive and cognitive judgments (Dhar & Gorlin, 2012). Previous research has investigated the role of both types of judgments in choice inconsistencies; however, some important questions remain unanswered: How severe are choice inconsistencies triggered by both types of judgment? Can such inconsistencies lead to a significant waste of money? We try to answer these questions by using the General Axiom of Revealed Preferences (GARP) and Afriat Index to examine budget waste coming from the two types of judgments.

Literature findings are not clear. Several studies suggest that utility loss from suboptimal choices can stem from behavior triggered by intuitive judgments, as a lot of behaviors that can be viewed as suboptimal, such as lack of self-control and hyperbolic discounting, are attributed to intuition (Wertenbroch, 2003). On the other hand, a stream of research has shown that cognitive judgments can have a negative impact on decision quality, as cognition can act as a form of distraction which can pull attention away from the most relevant information, and as such lead to inconsistent behavior (Lee et al., 2009). Last, some studies suggest that waste of budget does not necessarily result from a specific system, but rather from a potential discrepancy between types of processing and/or decision situations (Read & Loewenstein, 1995).

However, none of the above studies has used a direct measure of severity of inconsistent choices involving conditions with different price regimes and budget restrictions. We do precisely that by employing a measure capturing the severity of choice inconsistencies, and translate this into budget loss. In two experiments we conduct an investigation of the severity of inconsistent choices (coming from behaviors triggered by the two types of judgments) by using the General Axiom of Revealed Preferences (GARP) and Afriat Index to examine choice behavior in terms of efficient budget use.

In both of the studies we asked individuals to complete a task assessing budget waste coming from inconsistencies in two different sessions. In one session they relied more on intuition to complete the task, and in the other session they relied more on their cognition. We found that the budget waste in the session in which participants used their intuition was not significantly different from that in the session where they used their cognition. However, when we calculated the overall budget waste across both sessions, we found that this was significantly higher than the budget waste in the different sessions individually. We conclude that the discrepancy in choices resulting from intuitive versus cognitive judgments is

responsible for significant loss of decision utility in individuals' economic decisions, rather than choice inconsistencies resulting from a specific type of evaluation in itself.

Introduction to Essay 2

The economic turmoil of the past years has increased the number of people experiencing financial insecurity (World Health Organization, 2014). Research has shown that resource scarcity can have a significant impact on different aspects of individuals' behavior (e.g. Shah et at al., 2012). We focus on the responses to social influence. Social influence can have substantial impact on consumers' decision making (Wood & Hayes, 2012) as it is used as a tool for changing behaviors (e.g. Goldstein et al., 2009). Earlier findings suggest that financial constraints might enhance consumers' sensitivity to social influence (e.g. Drèze & Nunes, 2011) but it is not clear how general this phenomenon is. Recent studies have suggested that individuals' responses to resource scarcity can be adaptive. These studies used life-history theory to show that behavior of individuals facing adversities such as resource scarcity depends on their childhood socioeconomic background (Ellis, et. al., 2009). In essay 2, we use life-history theory to examine the impact of resource scarcity on conformity.

In three studies we find that resource scarcity leads people who grew up poor to conform to social influence, while it does not have an effect on people who grew up rich. We speculate that these diverse effects of resource scarcity on conformity are due to the harsh conditions low SES people grew up in. Specially, harsh and unpredictable environments are characterized by increased dangers and mortality. This makes the acquisition of information through individual learning difficult and in many cases dangerous. When information is highly costly to be acquired with individual learning, individuals turn to social learning (conformity) to acquire information (Boyd & Richerson, 1998; Morgan et al., 2011).

Therefore, low SES individuals raised in harsh childhood environments are sensitized to acquire information through social learning. Resource scarcity cues makes them use the learning strategies learnt in their childhood and this makes them more conformist. On the other hand, people coming from high SES backgrounds are sensitized to use individual learning and rely on their own opinion as a result of the benign environments they lived in during their childhood. Therefore, resource scarcity cues make them use the learning strategies that they have been sensitized with during their childhood (individual learning), and thus they do not get influenced by the opinion of others.

Introduction to Essay 3

Each day, individuals make financial decisions large and small, many of which involve an element of risk. Although research has provided a psychologically more proximate account for variables influencing risky decision-making, many studies fall short of identifying the underlying social functions that risk-taking serves. Recent studies taking a more evolutionary perspective suggest that financial risk-taking is connected with individual differences that are tied to fundamental motives (e.g. self-protection and reproduction; Griskevicius & Kenrick, 2013). In accordance with these recent findings, we find that differences in mating tactics can be an important variable influencing risk-taking.

In two studies we find that the adoption of different mating strategies can lead to different levels of financial risk-taking. Evolutionary theories on human mating argue that individuals have two main mating strategies, long- and short- term strategies (e.g. Buss & Schmitt, 1993; Gangestad & Simpson, 2000). According to the literature, the different tactics can have a different impact on behaviors when mating goals are salient (Sundie et al., 2011). In line with this notion, our findings show that mating goal salience makes people who adopt long-term tactics to become less risk-taking, while mating goal salience does not have an

impact on people who adopt short-term strategies. We provide several explanations for this differential effect, and propose directions that future research could follow in order to shed more light on it.

ESSAY 1: A DUAL-PROCESS MODEL OF ECONOMIC DECISION MAKING: THE SYMMETRIC EFFECT OF INTUITIVE AND COGNITIVE JUDGMENTS ON OPTIMAL BUDGET ALLOCATION

Abstract: Understanding the influence of dual-processing system on budget waste resulting from choice inconsistencies is critical in helping individuals maximize decision utility. In two studies we rely on the Generalized Axiom of Revealed Preferences (GARP) to explore the severity of choice inconsistencies resulting from intuitive and cognitive judgments separately, as well as overall severity across the two types of judgments. We find that budget waste resulting from intuitive and cognitive judgments is comparable, but that overall budget waste across the two types of judgments is significantly higher. These findings suggest that the discrepancy in choices resulting from intuitive versus cognitive judgments is responsible for significant loss of decision utility in individuals' economic decisions, rather than choice inconsistencies resulting from a specific type of evaluation in itself. We discuss theoretical and practical implications of our findings.

Introduction

Individuals often go grocery shopping to buy food to consume throughout the week. One of their basic goals is to choose products that maximize their utility given the available budget. However, very often people make inconsistent decisions, potentially resulting in inefficient budget use and a loss of utility (Kahneman, 2003; Kahneman & Thaler, 2006). Understanding this process is essential in order to help individuals improve the quality of their decisions, and as a result to enhance their welfare (Ratner et al., 2008).

A lot of research has linked inconsistent choices to behavior triggered by two different types of judgments, often referred to as *intuitive* and *cognitive* (Dhar & Gorlin, 2012). Intuitive judgments are relatively automatic, quick and effortless, whereas cognitive judgments are more deliberate, slow and effortful. Previous research has investigated the role of both types of judgments in choice inconsistencies. However, some important questions remain unanswered: How severe are choice inconsistencies triggered by both types of judgments? Can such inconsistencies lead to a significant waste of money? To the best of our knowledge, there is no study investigating whether inconsistent choices resulting from reliance on either intuitive or cognitive judgments lead to inefficient use of individuals' budget and thus waste of money.

Relying on the theory of revealed preferences and the Afriat Index, we develop a task that allows us to investigate severity of choice inconsistences created by the two types of judgments. We do this by capturing budget loss resulting from choice behaviors relying on either type of judgments. Apart from quantifying severity of choice inconsistencies, our task adds to existing studies investigating decision quality in relation to intuitive versus cognitive judgments in several ways. First, our approach is non-parametric, which means that it does not rely on non-verifiable assumptions regarding the functional structure of preferences. Second, it allows to test choice consistency in a non-binary paradigm and thus to account for

menu dependence effects (menu dependence effects arise when the choice can vary parametrically with which collection of alternatives is available for choice).

We organize the article as follows. First, we review dual-process theories of decision making, and discuss key findings about how both intuitive and cognitive judgments can lead to inconsistent choices. Next, we introduce the theory of revealed preferences and the Afriat Index, and explain how those can assess choice inconsistency severity and quantify budget waste. We present two studies investigating budget waste triggered by the two types of judgments, and we conclude with a discussion of the results and their implications.

Dual-Process Theory

One of the important assumptions in behavioral science is that decision making is driven by two types of processes, intuition and cognition. Several studies have relied on this distinction between intuition and cognition, although different authors have been using different labels to refer to it, including (but not constrained to) nonverbal versus verbal processes (Paivio, 1986), associative versus rule-based system (Sloman, 1996), type I versus type II processes (Kahneman & Frederick, 2002), hot versus cold system (Metcalfe & Mischel, 1999), reflexive versus reflective system (Lieberman et al., 2002), and experiential versus rational system (Epstein, 1994, 2003). Intuitive judgments are quick and heuristic-based, whereas cognitive judgments are deliberate and rule-based. The main features of intuition are its automatic operation and minimal demands on working memory. Intuition operates mostly through components of associative memory, meaning that different associations emerge spontaneously and influence behavior. It tends to be rapid, unconscious, and uncontrollable (Evans & Stanovich, 2013). In contrast, the main features of cognition are the active engagement of working memory and analytical thinking. Cognitive processing happens willfully, and is effortful most of the time. It tends to be slow, conscious, and

controllable (Evans & Stanovich, 2013). It is important to note that this distinction between intuition and cognition is not definitive. That is, intuition and cognition do not act in isolation from each other: both are almost always active simultaneously. However, in some cases intuition puts more weight into the decisions, while in some other instances cognition is mainly responsible for the choices (Dhar & Gorlin, 2012).

Neuroscience has added evidence for the existence of this intuitive versus cognitive distinction. Several studies have shown a relationship between automatic responses and activity in the limbic system (anterior cingulate and amygdala) on the one hand, and a relationship between more analytic and controlled processes and activity in the frontal regions of the brain such as the prefrontal and orbital cortex (LeDoux, 1996; McClure et al., 2004; Panksepp, 2004) on the other. Awareness that such differences in processing exist has triggered a growing interest in the role of these different types of processing in decision making. Several studies have investigated the influence of intuitive and cognitive processing on the quality of individuals' decisions, which we discuss next.

Dual Processing and Loss of Utility

A stream of research has shown that cognitive judgments can have a negative impact on decision quality. This negative impact (in the form of suboptimal choices) can potentially lead to budget waste. According to this literature, cognition can hinder systematic processing in individuals' decisions (Toresdillas & Chaiken, 1999). Specifically, cognition has been regarded a form of distraction which can pull attention away from the most relevant information, and as such lead to inconsistent behavior. For instance, Lee et al. (2009) showed in four studies that more cognitive processing can lead to more transitivity errors. In these studies, transitivity was defined as a well-defined preference structure, such that for any set of bundles a, b, and c, if $a \geq b$ and $b \geq c$, it must also be the case that $a \geq c$. In another study,

Nordgren & Dijksterhuis (2009) showed that more deliberation led to a less consistent attitude towards products.

Studies on (un)conscious thought and decision making also show that cognitive judgments can lead to less accurate decisions in some situations (Dijksterhuis, 2004; Dijksterhuis et al., 2006). For instance, in Dijksterhuis' (2004) study participants had to choose their favorite product (e.g. apartment or car) from a hypothetical set of options; some of the options had more positive attributes than other options. Participants who deliberated more chose significantly fewer options with positive attributes than participants who made a more intuitive choice. According to the authors, conscious thinking led to less polarized, clear, and integrated representations in memory and prevented meaningful clustering. Combined, although these studies do not provide measures on the severity of inconsistencies nor potential waste of budget, they provide a good indication that cognitive judgments can contribute to loss of utility.

On the other hand, several studies suggest that utility loss from suboptimal choices can stem from intuitive judgments. A lot of behaviors that can be viewed as suboptimal, such as lack of self-control and hyperbolic discounting, are attributed to intuition (Prelec & Loewenstein, 1998; Wertenbroch, 2003). According to the traditional economic point of view (Thaler & Shefrin, 1981), a person consists of two inner selves, a planner (cognition) and a doer (intuition), at any point in time. The planner is responsible for utility maximization whereas the doer, who exists only in the current period, is selfish and myopic. The planner is responsible for the more virtuous decisions which maximize long-term utility, whereas the doer often succumbs to indulgence and is responsible for impulsive behaviors and loss of long-term utility. In line with this view, O'Donoghue & Rabin (1999) showed that typical decisions based on intuition such as immediate gratification can cause welfare loss which may be severe on several occasions. In an experimental study, Van den Bergh, Dewitte & Warlop

(2008) found that "hot" stimuli inducing intuitive processing led individuals to become more impulsive in the pursuit of monetary rewards. Furthermore, Shiv et al. (2005) showed that participants able to use their emotions made less advantageous investment decisions and thus gained less money than participants not able to use their emotions (due to brain damage) and thus relying on cognition only for making decisions. Studies on resource depletion showed that depleted consumers, who are considered to rely on intuition, were willing to pay significantly higher amounts of money for the same products than consumers who were not previously depleted (e.g. Bruyneel et al., 2006). Taken together, this set of studies suggests that intuitive judgments can contribute to loss of utility. None of these studies provides insights in the severity of this utility loss or the potential budget waste related to it, however.

Adopting yet another perspective, some studies suggest that loss of utility (and/or budget waste) does not necessarily result from a specific type of judgment (i.e., from either intuitive or cognitive processing), but rather from a potential discrepancy between types of processing and/or decision situations. For instance, Read & Loewenstein (1995) found that when people choose multiple goods simultaneously (for instance during grocery shopping), they choose more variety of products than when they choose these goods sequentially (i.e., known as the "diversification bias"). According to the authors, this discrepancy in desired variety can potentially lead to inconsistent choices and loss of utility over time. Investigating the diversification bias further, Read et al. (1999) concluded that what appears to be desirable locally might not be likeable when adopting a more global perspective.

Furthermore, some other studies suggest that loss of utility caused by choice discrepancy might result from discrepant forecasting between different types of judgments (Kahneman & Snell, 2002; Kahneman & Thaler, 2006; Fisher & Rangel, 2014). For instance, Read and van Leeuwen (1996) showed that when people were hungry, they tended to choose more unhealthy food products compared to when they were satiated. In a similar vein, Fisher and

Rangel (2014) found that when hungry, individuals tend to evaluate all food items higher than when satiated. In general, when individuals use one type of judgment (for example their cognition), they are not able to correctly predict their own preferences resulting from the other type of judgement (for example their intuition). Fisher & Rangel (2014) also observed these mispredictions to be symmetric (i.e., they occurred from intuitive to cognitive and from cognitive to intuitive). To the best of our knowledge however, none of these studies has investigated whether these mispredictions can lead to inconsistent choices severe enough to end up in a loss of budget. Evaluating food differently or choosing different food items does not necessarily lead to waste of money (see method section and discussion for more detailed examples).

To summarize, findings on the influence of cognitive and intuitive judgments on utility loss are equivocal. There are studies implying that utility loss is driven by cognitive judgments, but there are also studies hinting at the idea that intuitive judgments lead to loss of utility. Yet other studies adopt a more neutral position, and suggest that a discrepancy between decision situations (and decision processes) may trigger inconsistent decisions, and thus result in an overall loss of utility. However, none of the studies has used a direct measure of severity of inconsistent choices involving conditions with different price regimes and budget restrictions. We do precisely that by employing a measure capturing the severity of choice inconsistencies, and translate this into budget loss. We believe that an investigation that does this could be very helpful in shedding light on the drivers of loss of utility. We will conduct such an investigation, and use the Generalized Axiom of Revealed Preferences (GARP) and the Afriat Index to examine choice behavior in terms of efficient budget use. We introduce GARP and the Afriat Index next.

Revealed Preferences and the Ariat Index Efficiency

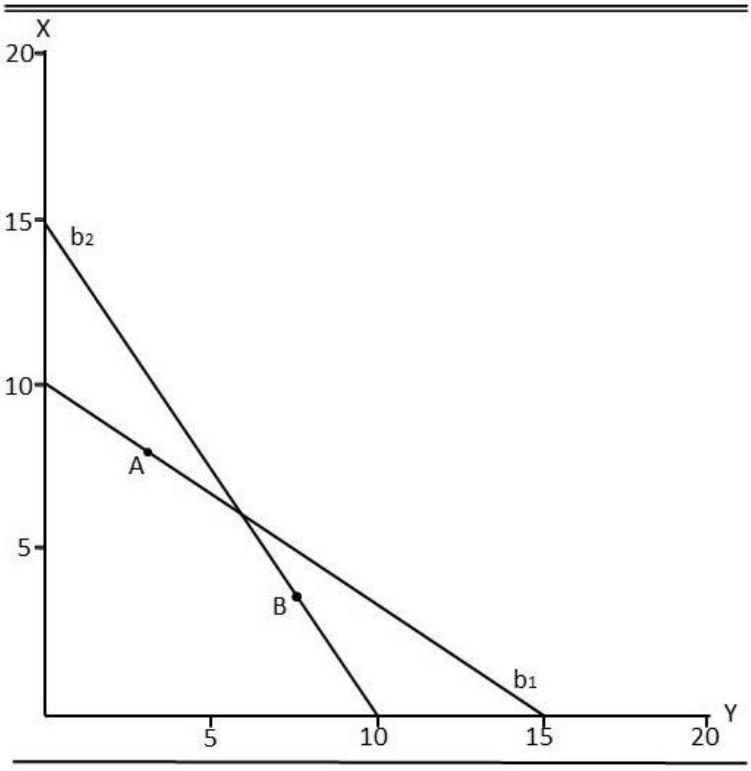
According to the traditional view in economics, preference consistency is a prerequisite for utility maximizing behavior (Choi et al., 2007). However, not all inconsistent choices have an equally significant negative impact on how efficiently people use their budgets (Harbaugh et al., 2001; Echenique, Lee, & Shum, 2011). In order to estimate utility loss triggered by inconsistent choices one could calculate how severe observed choice inconsistencies are. Revealed preference theory and the Afriat Index allow us to do this, as they translate choice consistency violations into an estimation of waste of budget.

Revealed preference theory was initiated by Samuelson (1938), according to whom a chosen bundle of goods x_i is "directly revealed preferred" over some other bundle x_t, if x_i is chosen when x_t is also in the budget set (i.e. x_t is not more expensive than x_i at the prevailing prices p_i). If the individual (as a utility maximizer) always chooses the best bundle s/he can get, then, if x_i is revealed preferred to x_t, s/he must never choose x_t when x_i is available. This requirement is called the Weak Axiom of Revealed Preference (WARP).

Varian (1982) formulated the Generalized Axiom of Revealed Preferences (GARP), which makes use of indirect revealed preferences. A chosen bundle of goods x_i is "indirectly revealed preferred" over some other bundle x_t, if and only if there exists a sequence of bundles x_j, x_k ,… , x_s such that x_i is directly preferred over x_j, x_j is directly preferred over x_k, … , and x_s is directly preferred over x_t. According to GARP, if a bundle x_i is indirectly revealed preferred to x_t, then x_t is not strictly directly revealed preferred to x_i, that is, x_i is not strictly within the budget set when x_t is chosen. Varian proved that GARP provides a necessary and sufficient condition for decision-makers' choices to be consistent with the maximization of a concave, positive monotonic, locally non-satiated and continuous utility function.

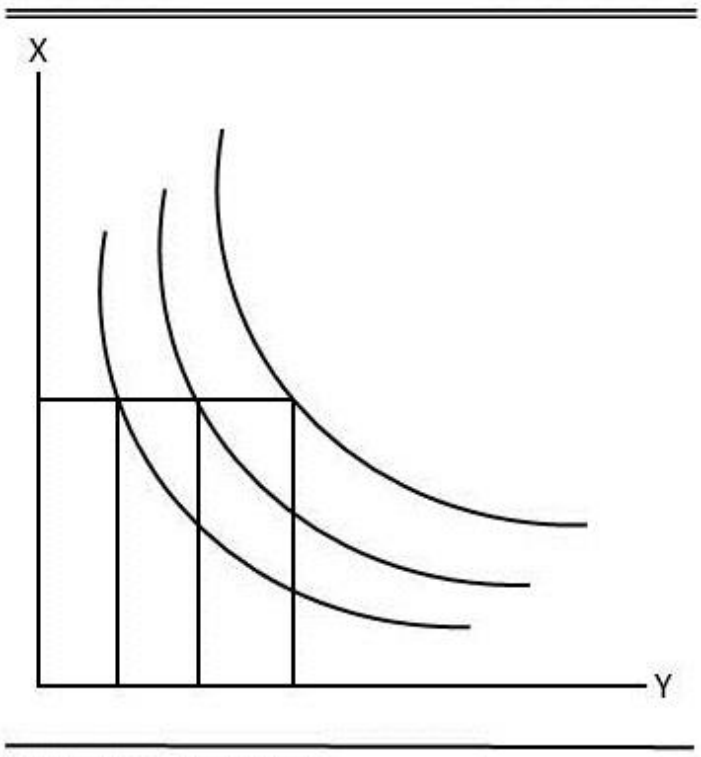
Figure 1 exhibits a GARP violation, which consists of a choice inconsistency that ends up in waste of budget. Suppose an individual wants to dedicate a budget of 120$ between 2 products X and Y. When the prices are p_1 (a price of 12 for X and a price of 8 for Y) the individual can buy all combinations below the budget line b_1. Suppose the individual chooses to buy the combination A (X=8, Y=3). When the prices change to p_2 (a price of 8 for X and a price of 12 for Y) all possible combinations that lie in the area below the budget line b_2 can be bought. Should the individual choose to buy the combination B(X=3, Y=8), this would violate GARP as bundle A is revealed preferred to bundle B, and bundle B is strictly revealed preferred to bundle A. By choosing combination B the individual actually wastes money as, for the given prices p_2, the revealed preferred bundle A was available at a lower cost (equal to 8*8+3*12=100$) than the chosen bundle B (in which case s/he pays 3*8+8*12=120$). In our example the individual thus failed to maximize the utility of the given budget as s/he chose bundle A over B at prices p_1 when B was cheaper (8*12+3*8=120$ for A and 8*8+3*12=100$ for B), while s/he also chose bundle B over A at prices p_2 when bundle A was cheaper (8*8+3*12=100$ for A and 8*12+3*8=120$ for B). In each situation s/he spent 120$ (240$ in total). If s/he had chosen B over A at prices p_1 and A over B at prices p_2 s/he would have spent 100$ in each situation (200$ in total) and ended up with the same quantities of products. This difference of 40$ constitutes waste of budget. Below we will introduce the Afriat Index as a measure for the efficiency of individuals' choices, which captures exactly this idea of budget waste associated with behavior that violates GARP.

Figure 1
GARP Violation



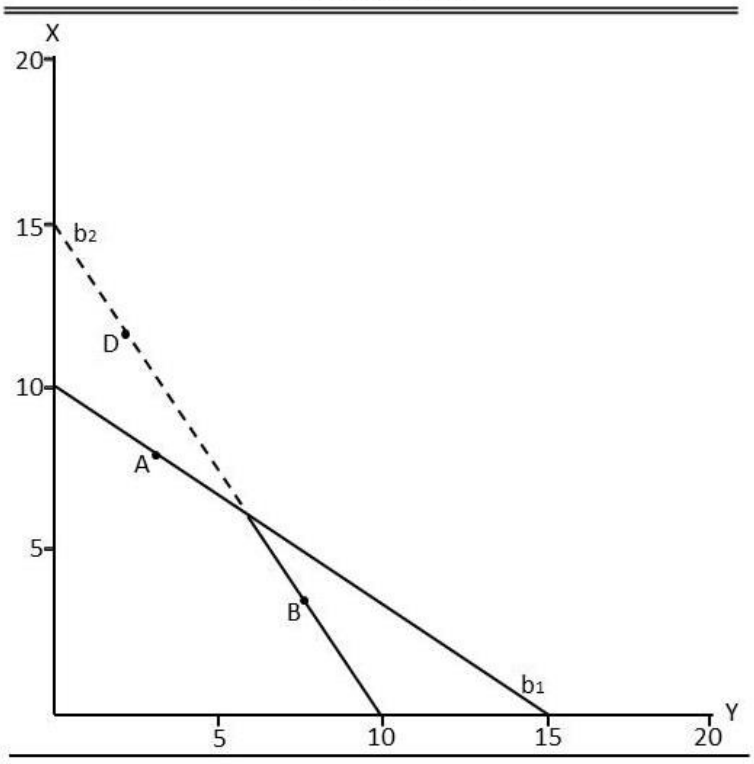
The essence of revealed preference theory and GARP lies in the concept of indifference curves. Indifference curves show the different bundles of goods between which a decision maker is indifferent. In other words, indifference curves show the quantity of product X an individual is willing to sacrifice to get a certain quantity of product Y. A utility maximizing individual always wants to move to higher indifference curves as s/he gets better bundles of products, meaning that s/he can combine the same quantity of X with larger quantities of Y (see figure 2) and vice versa.

Figure 2
Indifference Curves



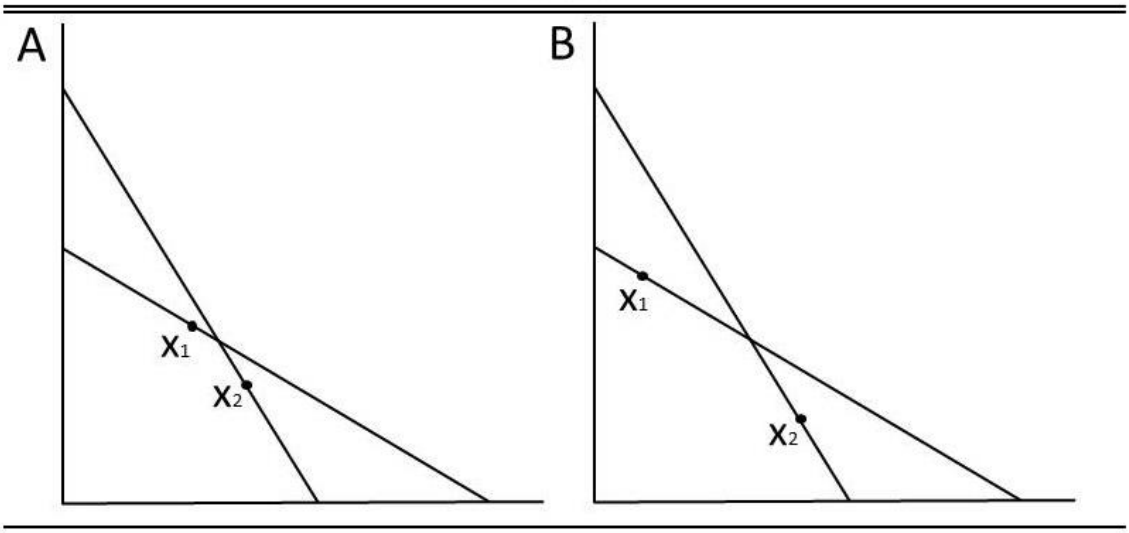
In the case of the above example, a choice that maximizes the utility of the available budget at prices p_2, given the fact that the individual chose the combination A (X=8, Y=3) at prices p_1, would be combinations placed on the dotted section of the budget line b_2, for example the combination D (X=12, Y=2) in figure 3. Choosing these combinations would allow the individual to move to higher indifferences curves and end up with bundles containing larger quantities of products. However, choosing combination B (X=3, Y = 8) would not. As one can observe, GARP does not necessarily punish every change in preferences but merely those that are harmful for the efficient use of the available budget.

Figure 3
Rational Choice



Afriat (1973) has introduced an efficiency index which can be used to measure the severity of GARP violations. This measure has been developed in the context of budget waste. As explained above, a violation of GARP can be interpreted as a waste of money. Basically, the Afriat Index measures the overall efficiency of individuals' choices as the fraction of their budget that is wasted when GARP is violated (see Afriat (1973) and Varian (1990, 1991) for precise formal definitions). The index can take values between 0 and 1. A value of 1 means that there are no GARP violations (and no budget is wasted), whereas a value below 1 reveals that GARP is violated (with corresponding budget waste). Lower index values indicate that a larger fraction of the budget is wasted. In general, more severe inconsistencies in choices have a bigger impact on the Afriat Index. For example, the situation in the left panel of figure 4 implies a less severe GARP violation and, therefore, a higher value for the Afriat Index than the situation in the right panel of figure 4.

Figure 4: Severity of GARP violations. B a more severe violation



Several studies have used revealed preferences in experimental settings to investigate whether people behave consistently. Battalio et al. (1973) used data from choices made by female patients at a psychiatric hospital. Participants bought goods at a commissary, where the prices were arranged to change periodically. Between 5 and 50 percent of participants made choices that violated revealed preference axioms of choice consistency. In a sample of college students, Sippel (1997) studied choices for eight different consumption goods, using ten different budget sets. He found that more than 50% of participants violated GARP. However, both Sippel and Battalio et al. measured only the number of GARP violations and not the severity.

Harbaugh et al. (2001) is one of the first studies that used GARP and the Afriat Index to investigate the severity of choice (in)consistencies in children by asking them to decide between bundles of food products. They found that although the level of choice consistency appeared already high at the age of seven, the 7-year olds behaved less consistently than the 12 year-olds and the adults they studied. Andreoni & Miller (2002) investigated consistency of altruistic behavior using a modified version of a dictator game. They found a high degree

of heterogeneity between individuals: whereas some individuals behaved consistently altruistic or egoistic, others were quite inconsistent in their social preferences.

We will rely on GARP and the Afriat Index in an experimental setting to obtain more insight in choice consistency and budget waste when individuals make decisions relying on intuitive versus cognitive processing. To calculate the Afriat Index we construct a choice task in which decision-makers have to choose between 4 products on 12 different occasions, and the prices of the products vary across occasions. Individuals have to go through this measurement twice, once using their intuition and once relying on cognition. This allows us to assess budget loss from choice behavior based on the two types of judgment separately. As the measurements are comparable, we can also calculate an overall Afriat Index as an indication of budget waste resulting from inconsistent choices made across both types of judgments. As such, these indices allow us to compare overall budget waste with budget waste caused by both types of judgments separately (cognitive versus intuitive). We use this rationale in two studies.

Study 1

The goal of the first study was to assess the extent of budget waste resulting from decisions relying more on cognitive versus intuitive judgment.

Method

Participants

Participants were 138 students from a large university (43.9% women, average age 20.43 years, SD=2.01). They were invited to come to the lab to complete a task designed to capture the severity of inconsistent choices, in exchange for money or course credit.

Participants came to the lab in groups of 10, and completed the task individually on a pc in a semi-enclosed cubicle.

Design

Procedure

As a manipulation of cognitive and intuitive judgments we varied the visceral state hunger. A visceral state has a direct hedonic impact and influences the relative desirability of different goods and actions (Loewenstein, 1996). Its function is to grab the attention needed to ensure that certain actions are taken (e.g., obtaining food when hungry; Loewenstein, 2000). Visceral states function with minimal higher-level cognitive mediation, and thus can have a large influence on behavior without the interference of cognitive deliberation (LeDoux, 1996; Loewenstein, 2000). In general, people who are in a visceral state tend to rely more on intuitive judgments than people who are not in a visceral state (Nordgren, et al., 2007).Visceral influences have been associated with more intuitive and less deliberative behaviors such as over-eating (Loewenstein, 2000). In particular, hunger can lead to a variety of behaviors that can be characterized as more intuitive than cognitive. For instance, hungry people crave food more (Ditto et al., 2006), tend to forget about their weight goals (Nordgren, Van der Pligt & Van Harreveld, 2008) and spend more, even on non-food objects (Xu , Schwarz & Wyer, 2015).

We used a mixed design consisting of three between-subjects conditions: An experimental condition in which intuitive and cognitive judgments were activated sequentially during two choice-making episodes, and two control conditions in which only one of the two types of judgments was activated (intuitive or cognitive) during both choice-making episodes. In all conditions, the measurements were separated by one week (choice-making episodes were manipulated within-subjects). Similar to the design of Nordgren et al. (2007), in the

hungry (intuition) state participants were instructed to not eat for at least four hours prior to the study. In the satiated (cognition) state, participants were instructed to eat a full meal within the hour prior to the study. In the experimental condition, participants completed the choice task once hungry (intuition) and once satiated (cognition). The order of the tasks was counterbalanced, and did not influence the results. In the "cognition" control condition participants were asked to come to the lab satiated (eat a full meal within the hour prior to the study) both times, whereas in the "intuition" control condition participants were asked to come to the lab hungry both times. The purpose of the control conditions was to increase confidence that potential differences in the Afriat Index between sessions in the experimental condition could be attributed to differences between the two types of judgments, rather than to noise driven by the one week time lag in between experimental sessions.

Revealed Preference Task: To be able to calculate the Afriat Index we created a choice task. Our task was similar to the one used in studies of Harbaugh et al. (2001) and Bruyneel et al. (2012). The task included 12 sequential choice problems, with each choice problem consisting of four products: two vice, relatively tasty but not so healthy (chocolate bar and Dorito chips) products and two virtue, relatively healthy but not so tasty (baby carrots and raisins) products. The prices of the products differed for every choice problem. Participants were asked to indicate the quantities they wanted from each product given the different price regimes and their budget (10 tokens). For every choice problem participants had to spend their entire budget and had the option to choose non-integer quantities.

The price-income regime in the task (variation in prices and a fixed budget) implies a high power for testing choice consistency, which means that the probability of detecting inconsistent behavior is high (Bronars, 1987). High power arises from the fact that there is a lot of variation in prices and no income variation (Cherchye and Vermeulen, 2008). Table 1 presents a summary of our choice task.

Table 1: Revealed Preferences Task

Choice Problem	Prices per 10 gr				Budget
	Carrots	Raisins	Chocolate Bar	Dorito Chips	
1	5	3	4	4	10
2	5	4	3	4	10
3	5	4	4	3	10
4	3	5	4	4	10
5	4	5	3	4	10
6	4	5	4	3	10
7	3	4	5	4	10
8	4	3	5	4	10
9	4	4	5	3	10
10	3	4	4	5	10
11	4	3	4	5	10
12	4	4	3	5	10

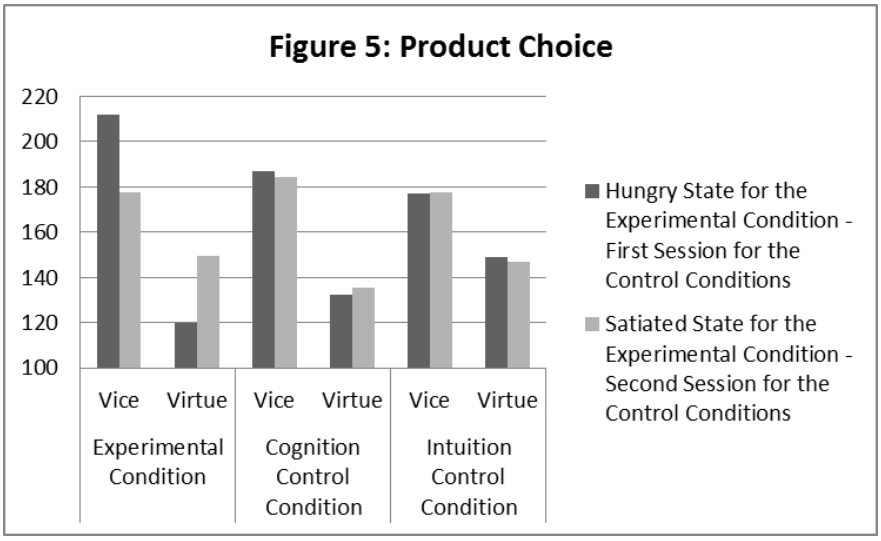
Measures

When completing the choice task, participants had to choose between virtue and vice products. To check whether the manipulation of cognitive versus intuitive processing was successful, we measured the relative occurrence of virtue and vice choices in both sessions. We expected choices in the hungry (intuition) state to be more vicious in nature than choices in the satiated (cognition) state. For every respondent we also calculated the Afriat Index for each session separately, as well as the aggregated Afriat Index across both sessions (the type of judgment varied across sessions in the experimental condition but remained constant in the control conditions). We compared these three different indices to investigate differences in severity of choice inconsistencies and budget waste resulting from the different types of judgments.

Results and Discussion

Product Choice

A paired samples test showed that in the experimental condition, respondents chose more grams of vice products when hungry (intuition; M_{hungry}=211.99, SD=72.81) than when satiated (cognition; $M_{satiated}$=177.87, SD=82.20; t(66)=3.90, p<0.001) (see figure 5), whereas they chose fewer grams of virtue products when hungry (M_{hungry}=119.87, SD=70,38) than when satiated ($M_{satiated}$=149.52, SD=79.20; t(66)=3.49, p=0.001). In the control conditions none of the differences were significant. Specifically, in the cognition control condition the quantities of vice and virtue products chosen in the first session (M_{vice}=186.89, SD=92.57; M_{virtue}=132.55, SD=92.88) were not significantly different from those chosen in the second session (M_{vice}=184.14, SD=85.38; M_{virtue}=135.58, SD=82.52; t_{vice}(30)= 0.575, p=0.569; t_{virtue}(30)=-0.554, p=0.584). Similarly, in the intuition control condition the quantities of vice and virtue chosen in the first session (M_{vice}=178.00, SD=80.06; M_{virtue}=148.77, SD=72.97) did not differ significantly from those chosen in the second session (M_{vice}=176.74, SD=84.66; M_{virtue}=149.65, SD=79.22; t_{vice}(39)= -0.230 p=0.819; t_{virtue}(39)=0.158, p=0.875).



Additionally, we compared the differences between vice choices in the two sessions across conditions and did the same for virtues. The comparison showed that the difference in both vice and virtue choices for the two sessions was significantly larger in the experimental

condition than in the two control conditions (combined) ($t_{vice}(136)=3.884$, $p<0.001$; $t_{virtue}(136)=2.115$, $p=0.036$).

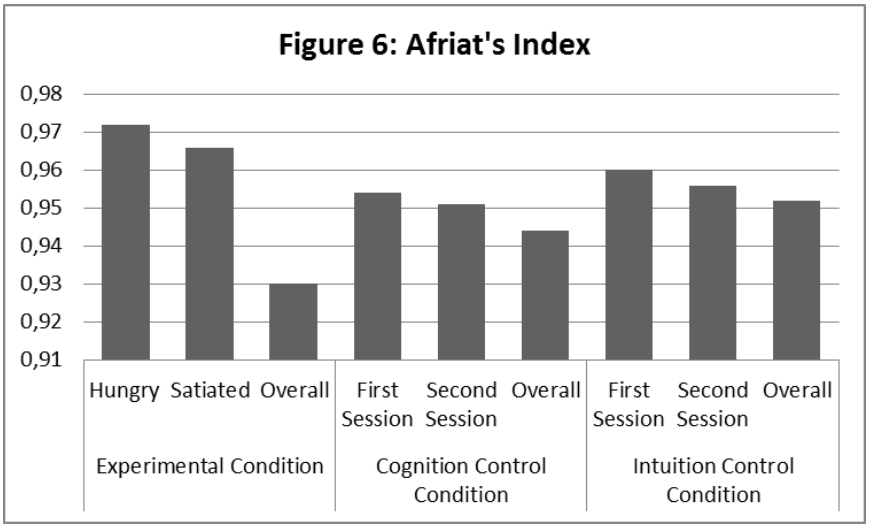
Budget Waste

Comparing the Afriat Indices resulting from choices in both sessions in the experimental condition, we found that the difference was insignificant ($M_{hungry}=0.972$, $SD=0.081$; $M_{satiated}=0.966$, $SD=0.054$; Wilcoxon $Z=-0.826$, $p=0.409$). These results indicate that the proportion of the budget wasted was similar for both types of judgments (cognitive versus intuitive).

We also calculated the overall Afriat Index across the two sessions (different types of judgments) in a way that allowed us to directly compare it with both indices resulting from choices relying on either type of judgment separately. This is possible as the power and thus reliability of the choice test depends by construction on three components: the number of observations, the price variation, and the choice of budget sets (Cherchye and Vermeulen 2008). To meaningfully compare two Afriat Indices these components have to be the same. Therefore we constructed an overall Afriat Index with components that were identical to the ones of the separate indices. Specifically, we randomly picked six observations from each session dataset for each respondent to neutralize the fact that the Afriat Index is sensitive to the number of observations. We avoided picking the same price regime twice to secure that the price regime and the specific choice sets were identical with that of the within-sessions tests. This yielded a dataset consisting of 12 observations per individual that allowed us to calculate an overall, cross-states Afriat Index that was directly comparable to the separate, within session indices. We repeated the same procedure 200 times and calculated the average of the overall Afriat Index for every respondent. We observed that the overall index was significantly lower ($M_{overall}=0.93$, $SD=0.077$) than both indices calculated based on choices

relying on intuitive versus cognitive judgments, respectively (Z=-3.836, p<0.001 for intuition; Z=-3.169, p=0.002 for cognition). Percentage of budget wasted was approximately 3% for judgments relying on either intuition or cognition, whereas overall it was 7%.

The difference between the indices in the cognition control condition were all insignificant. The Afriat Index calculated from choices in the first session ($M_{Session1}$=0.954, SD=0.091) was not significantly different from the Afriat Index calculated from choices in the second session ($M_{Session2}$=0.951, SD=0.119; Z=-0.568, p=0.570). In addition, these two indices were not significantly different from the overall index calculated from choices across sessions ($M_{overall}$=0.944, SD=0.106; $Z_{session1}$=-0.597, p=0.550, $Z_{session2}$=-1.232, p=0.218). The overall Afriat Index was calculated in the same way as the overall Afriat Index in the experimental condition (cf. supra). Results were similar for the intuition control condition. The index calculated from choices in the first session ($M_{Session1}$=0.962, SD=0.077) was not significantly different from the index calculated from choices in the second session ($M_{Session2}$=0.954, SD=0.087). Neither of these indices was different from the overall index calculated from choices across sessions ($M_{overall}$=0.952, SD=0.070; $Z_{Session1}$=-1.232, p=0.218; $Z_{Session2}$=-1.003, p=0.316).



Additionally, we calculated the absolute difference between the overall Afriat Index on the one hand and both separate Afriat Indices (which we averaged) on the other in all conditions, and compared these differences across conditions. We found that the difference ($d_{experimental}$ =0.031) in the experimental condition was significantly larger than in the two (pooled) control conditions ($d_{control}$=0.006; t(136)=3.312, p=0.001).

The findings of our first experiment suggest that the degree of choice inconsistency and budget waste resulting from either intuitive or cognitive judgments is comparable. Although choice behavior relying on intuition (hungry state) was more vicious (the quantity of vice products chosen was larger) compared with choice behavior relying on cognition (satiated state), choice inconsistencies and budget wasted resulting from both types of behaviors as measured by the Afriat Index were not significantly different. Specifically, budget wasted when relying on intuitive versus cognitive judgments was approximately 3% in both instances, indicating that respondents wasted only 3% of the budget on suboptimal choices regardless of whether they used their cognition or intuition to decide. However, the overall budget waste across types of judgments was significantly higher (7%). Thus, though loss of utility from choice behaviors relying on the different types of judgments was similar when assessed separately for each type of judgment, the preferences revealed by the two types of judgments had a negative impact on utility when pooled and assessed together.

Study 2

The aim of the second study was to replicate the results of the first study using another manipulation of intuitive versus cognitive judgment. To test the robustness of our results, in the second study we used another manipulation to trigger intuitive versus cognitive judgments that has been used in numerous studies in the past (e.g. Shiv & Fedorikhin, 1999; Trope & Alfieri, 1997): cognitive load. Cognitive load prevents individuals from deliberating and

makes them use their intuition more (Shiv & Fedorikhin, 1999). Furthermore, we wanted to incentivize respondents to make utility maximizing choices by increasing the available budget in the choice task (from 10 to 20 tokens) and offering participants one of their choices at the end of the session. This is in contrast to study 1 where choices were hypothetical.

Method

Participants

Participants were 118 students from a large university (60% women, average age 21.18 years, SD=3.62). They were invited to come to the lab in exchange for money or course credit.

Design

Procedure

We again made use of a mixed design including three between-subjects conditions, completed in two sessions (48 hours difference; manipulated within-subjects). Specifically, in the experimental condition a different type of judgment (once intuitive and once cognitive) was activated in each session (the order was counterbalanced and did not affect the results), whereas in the two control conditions the same type of judgment was activated (either intuitive or cognitive) in each session. Specifically, a cognitive load task was used as a manipulation of the two types of judgment. That is, participants were asked to keep in mind a difficult sequence of 8 different consonants (e.g. GTPWLZKN, high cognitive load or intuitive judgment) or an easy sequence of 8 identical consonants (BBBBBBBB, low cognitive load or cognitive judgment) (Kruger, 1999). We reasoned that in the high cognitive load condition, the intuitive system would become relatively stronger than the cognitive system compared to the low cognitive load condition.

Participants were given a piece of paper displaying the sequence for 90 seconds, and were asked to memorize it. In the experimental condition, participants executed the decision task (similar to the one used in study 1) while keeping in mind the difficult sequence (intuitive judgment) in one of the two sessions, and while keeping in mind the easy sequence (cognitive judgment) in the other session. In the cognition control condition participants were asked to keep in mind the easy sequence while making their decisions in both of the sessions, whereas in the intuition control condition participants had to keep in mind the difficult sequence while making decisions in both of the sessions. All the participants managed to reproduce at least 70% of the sequence and therefore all of them were kept in the analysis.

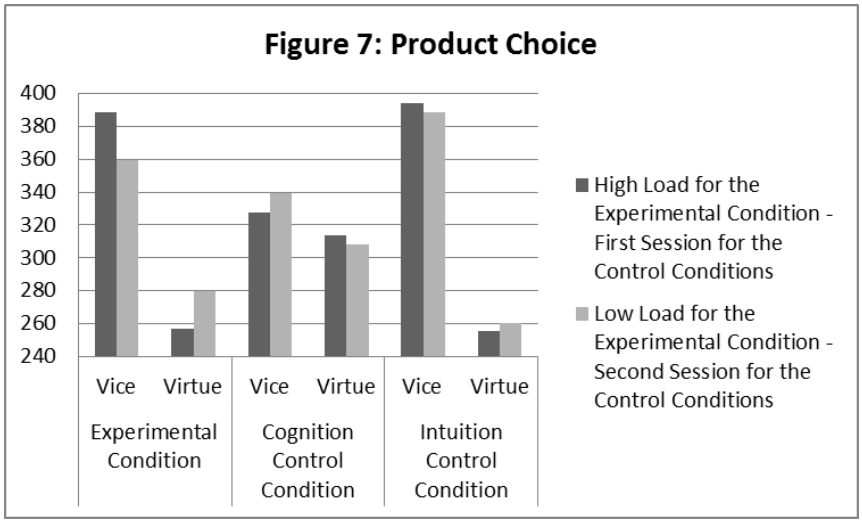
Measures: Similar to the first study, participants had to choose quantities of four products (the same 2 virtues and the same 2 vices that were also used in study 1) in each of twelve choice situations with different price regimes. As mentioned above, the only difference compared to study 1 was that the budget for every choice exercise was doubled. Furthermore, participants were (truthfully) told that they would be entitled to one of their chosen product bundles at the end of every session. As a manipulation check we again measured the relative virtue and vice choices resulting from cognitive versus intuitive judgment. Furthermore, for every respondent we calculated the Afriat Index for choices resulting from each type of judgment separately and both types of judgments combined.

Results and Discussion

Product Choice

A paired samples test showed again that in the experimental condition respondents chose more grams of vice products when they were under high cognitive load (intuitive; $M_{highload}$=388.67, SD=150.21) than when they were under low load (cognitive; $M_{lowload}$=359.57, SD=169.98; t(62)=2.620, p=0.011), whereas they chose fewer grams of

virtue products when under high load ($M_{highload}$=256.53, SD=145.57) than when under low load ($M_{lowload}$=280.05, SD=159.70; t(62)=2.302, p=0.025). In the control conditions none of the differences was significant. Specifically, in the cognition control condition the quantities of vice and virtue products chosen in the first session (M_{vice}=327.58, SD=146.87; M_{virtue}=313.91, SD=143.32) were not significantly different from those chosen in the second session (M_{vice}=339.23, SD=152.04; M_{virtue}=307.99, SD=138.94; $t_{vice}(23)$= -0.981, p=0.337; $t_{virtue}(23)$=0.487, p=0.631). Similarly, in the intuition control condition the quantities of vice and virtue chosen in the first session (M_{vice}=394.28, SD=119.50; M_{virtue}=255.51, SD=121.26) did not differ significantly from those chosen in the second session (M_{vice}=388.26, SD=128.29; M_{virtue}=260.43, SD=125.61; $t_{vice}(27)$= 0.417, p=0.680; $t_{virtue}(27)$=-0.336, p=0.740) (figure 7).

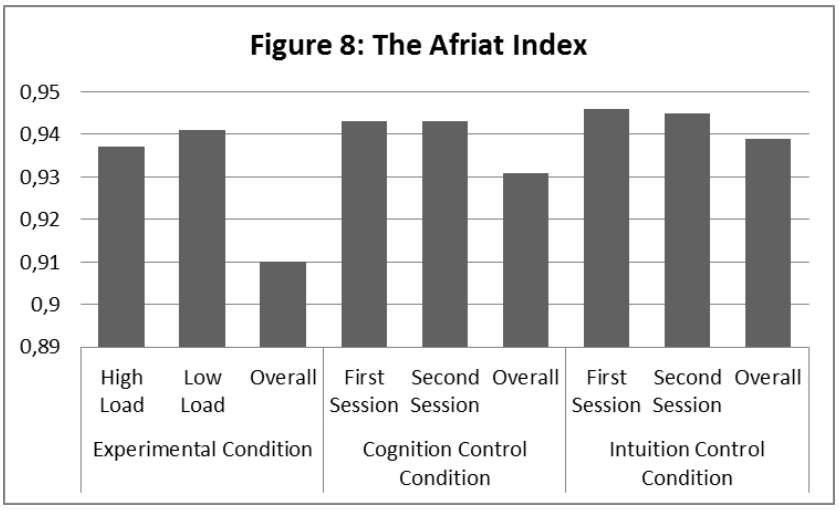


Additionally, again we compared the difference in vice as well as virtue choices between sessions across conditions. The comparison showed once more that the difference in vice choices between sessions was significantly larger in the experimental condition than in the two control conditions. The difference in virtue choices between sessions was marginally significantly larger in the experimental condition than in the two control conditions ($t_{vice}(115)$=1.992, p=0.049; $t_{virtue}(115)$=1.751, p=0.083). This pattern of choice confirms our expectations and replicates the findings of study 1.

Budget Waste

As in study 1, the difference in the Afriat Indices resulting from choices in both sessions in the experimental condition ($M_{highload}$=0.937, SD=0.108, $M_{lowload}$=0.941, SD=0.106) was insignificant (Wilcoxon Z=-0.077, p=0.939). These results again indicate that the proportion of the budget wasted was similar for both types of judgments (cognitive versus intuitive). After a similar processing of the data as in Study 1, we calculated the overall Afriat Index and compared it with the separate indices. The overall index was significantly lower ($M_{overall}$=0.913, SD=0.112) than the other two indices (Z=-2.144, p=0.032 for high load, Z=-2.362, p=0.018 for low load). Percentage of budget wasted was approximately 6% for judgements relying on either intuition or cognition, whereas overall it was approximately 9%.

As in Study 1, none of the differences between any of the indices in the control conditions was significant. In the cognition control condition, the Afriat Index calculated from choices in the first session ($M_{Session1}$=0.943, SD=0.093) was not significantly different from the Afriat Index calculated from choices in the second session ($M_{Session2}$=0.943, SD=0.123, Z=-0.063, p=0.950). In addition, these indices were not significantly different from the overall index calculated from choices across sessions ($M_{overall}$=0.931, SD=0.100; $Z_{Session1}$=-0.511, p=0.609; $Z_{Session2}$=-0.795, p=0.427). The results were similar for the intuition control condition. The index calculated from choices in the first session ($M_{Session1}$=0.946, SD=0.110) was not significantly different from the index calculated from choices in the second session ($M_{Session2}$=0.945, SD=0.113), and neither of these indices was different from the overall index ($M_{overall}$=0.939, SD=0.103; $Z_{Session1}$=-0.621, p=0.535; $Z_{Session2}$=-672, p=0.501).



As in Study 1, we calculated the absolute difference between the overall Afriat Index on the one hand and both separate Afriat Indices (which we averaged) on the other in all conditions, and compared these differences across conditions. Again, we found that the difference in the experimental condition ($d_{experimental}$=0.025) was significantly larger than in the two (pooled) control conditions ($d_{control}$=0.009; t(115)=2.110, p=0.037).

The purpose of study 2 was to replicate the results of study 1, using a different manipulation of cognitive versus intuitive processing. The findings indicate, in line with study 1, that the degree of choice inconsistency and budget waste resulting from behaviors relying on either intuitive or cognitive judgments is not significantly different, although the behaviors themselves (the actual choices being made) differ. However, once more we noticed a significant increase in budget waste when calculating the overall budget waste from choices made across situations. These results confirm that a significant waste of money results from conflicting behaviors triggered by the different types of judgments.

General Discussion

We conducted two studies to assess the degree of choice inconsistency from reliance on intuitive and cognitive judgment. We used two different ways to manipulate activation of intuitive versus cognitive judgment, and we measured budget wasted through inconsistent

choices using a task based on revealed preference theory. Results of both studies indicate that the extent of budget wasted resulting from choices relying on either of both types of judgments is not significantly different, despite the fact that product choices differ. We conclude that both types of judgments are equally appropriate to make consistent economic decisions. However, a further analysis revealed that the discrepancy between choices made under the influence of intuitive judgments on the one hand and cognitive judgments on the other had a significant impact on overall budget waste, as measured by the overall Afriat Index calculated from choices across situations in which intuitive and cognitive judgments were activated. This finding suggests that the discrepancy between choices resulting from the different types of judgment is responsible for a significant loss of decision utility.

Our findings provide an answer to the question as to which type of judgment leads to more severe choice inconsistencies. Our studies are the first to estimate how severe inconsistent choices resulting from intuitive versus cognitive judgment are. Our findings show that both types of judgments lead to an equal degree of choice inconsistency. Previous studies showing that cognitive judgment leads to more choice inconsistency have measured either the number of transitivity errors (Lee et al., 2009) or the extent of attitude inconsistency towards products (Nordgren & Dijksterhuis, 2009). However, transitivity errors differ in terms of their impact on budget waste (Harbaugh et al., 2001; Echenique, Lee, & Shum, 2011), as does the degree of attitude inconsistency. The authors attributed the choice and attitude inconsistencies they observed to cognitive noise, but our data suggest that cognitive noise may have a minor impact on overall budgeting efficiency. Furthermore, another research stream suggesting that intuitive judgment leads to less optimal choice making (Van den Bergh, Dewitte & Warlop, 2008; Shiv et al., 2005) has identified these suboptimal choices as biased by affective noise related to intuitive processes. Our data however suggest that affective noise only has a minor impact on overall budgeting efficiency. Although intuitive judgments have been found to lead

to some types of suboptimal decisions such as temporal discounting and more risk seeking, there is a set of findings suggesting that intuition is not by definition harmful and that its impact depends on the context and the type of decisions (e.g. Pocheptsova et al., 2009).

Compared to previous research studying the influence of cognitive versus intuitive judgment on choice consistency, our study is the first to include some important components in the experimental setting that have been ignored by previous studies: 1) a non-binary setting (respondents had to choose between more than two products), 2) the use of budget constraints and 3) the price variation. Theses added components may also have contributed to the discrepancy between previous findings and ours. Binary choice settings and pairwise comparisons have been shown to be particularly vulnerable to changes in attribute importance (Rieskamp, Busemeyer & Mellers, 2006). Furthermore, available budgets and prices are important drivers of economic decisions, as they set the broader context under which these decisions take place and thus define the level of consistent behavior (Becker, 1962; 1993; Samuelson, 1938). We show both types of judgments to be equally appropriate for making consistent economic decisions. The symmetry in our findings suggests that the decision making rules followed by intuition and cognition in economic contexts involving price regimes and budget constraints might not be all that different. This is consistent with recent proposals suggesting that cognitive and intuitive judgments can be based on common principles in certain environments (Kruglanski & Gigerenzer, 2011). Specifically, Kruglanski & Gigerenzer (2011) argue that in some environments in which relevant cues are set (for example in our case the budget constraints and price regimes) and the decisions are made sequentially, the two types of judgments will rely on the same rules to reach a decision. By rules the authors refer to the inferential devices used for categorization, estimation, paired comparisons, and other judgmental tasks that go beyond the given information.

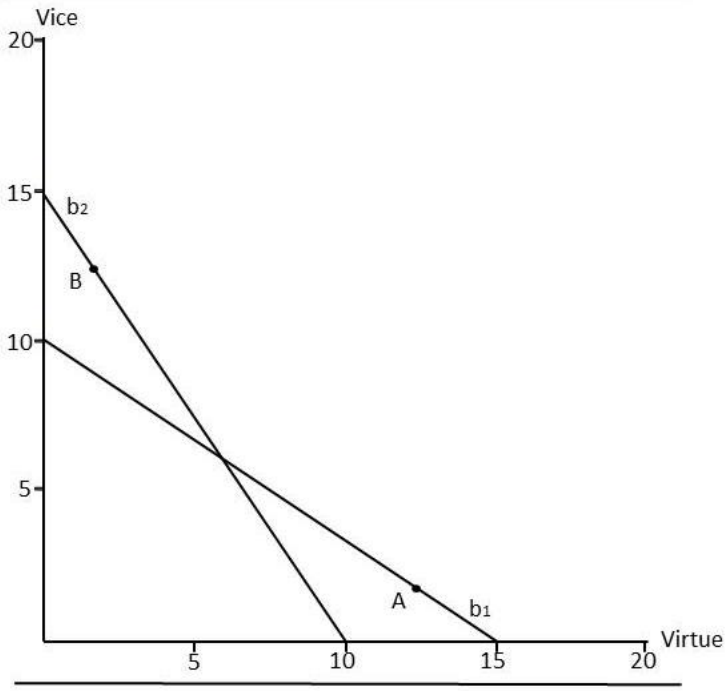
Our findings can be related to literature on affective forecasting errors and hot-cold (and cold-hot) empathy gaps. Kahneman & Thaler (2006) argued that when people make choices they tend to forecast utility of an outcome. When the forecast is wrong, decision-makers experience loss of utility in the future. For example, a very hungry shopper doing his/her weekly shopping at the beginning of the week may buy very large portions of food or a greater variety in food products, and end up having (too much) food at home that s/he does not like very much. On the other hand, satiated shoppers who underestimate the value of hedonic products will focus on a specific set of goods, and end up with a basket of products that they do not really want to consume when hungry. In both cases, wrong forecasting results in loss of experienced utility at time of consumption (Kahneman & Thaler, 2006). Although we did not directly test forecasting errors, we show how the gap between the two types of judgments prevents individuals from forming global preferences that will enable them to make more optimal decisions. A hungry shopper (relying on intuitive judgments) forms his/her preferences between various products as if the importance of the products and their prices will still be the same for him/her when satiated (when s/he will be relying on cognition to make his/her choices). Our findings show that the actual dissimilarity in the preferences can lead to severe inconsistencies which end up in a significant waste of budget from an overall perspective.

We contribute to the literature on economic decision making by showing that loss of utility due to inconsistent choices is not a result of the decisions driven by one specific type of judgment directly, but of the conflicting choices driven by these two types of judgment separately instead. Our findings suggest that, although the levels of waste of budget resulting from either intuition or cognition is not different, the discrepancy between choices resulting from these two different types of judgment can lead to more severe suboptimal choices and significant budget waste. We speculate that in order to reach the indifference levels that allow

them to choose products, individuals using either intuition or cognition give weights to the attributes of the products, which very often differ. For instance, “taste” is perceived and weighted as more important by intuition than by cognition (Fisher & Rangel, 2014). One result of such a dissimilarity in attribute weights is that the levels of indifference between various products reached by both types of judgment are different (Goldstein, 1990). Such dissimilar indifference levels should prevent decision-makers from moving to higher indifference curves and thus optimize the use of their budgets across decision situations in which they rely on different types of judgments.

It has to be highlighted that the consistency violations we detect from an overall perspective are not just changes in preferences. They are miscalculations in individuals’ economic logic that are severe enough to cause significant budget loss. The Afriat Index and GARP allow changes in preferences without necessarily punishing those. Figure 9 exhibits how individuals can change their preferences and in one instance for example choose a bundle with larger quantities of vice products (for example when using their intuition; choice B) and in another instance choose a bundle of goods containing larger quantities of virtue products (for example when using their cognition; choice A) without violating GARP (and thus without wasting budget). Future research can investigate ways of dealing with the discrepancy in preferences between both types of judgment in a more economically optimal way. In other words, future research could investigate how to help individuals make choices which comply with diverging preferences between the two types of judgment, and at the same time not waste budget.

Figure 9
Change of Preferences without violating GARP



Taking a broader perspective, our results suggest that self-control strategies characterized by anticipation of an upcoming event and the deployment of certain means to prevent one's future self from acting on desire, can have a negative impact on preference consistency. Employing strategies such as counteractive self-control, guilt, or other complex incentive schemes (e.g. Ariely & Wertenbroch, 2002; Fishbach, Dhar & Zhang, 2006) which bring more conflict between the two types of judgment might lead to more suboptimal choices from an overall perspective. For instance, a hungry shopper trying to suppress the weight of an attribute such as taste (counteractive self-control) might reach indifference levels between products that differ from the levels reached in a hungry as well as from those reached in a satiated state (as preferences across types of judgment seem hard to predict). Creating a third level of indifference may drive the overall waste of budget to even higher levels. Techniques aimed at increasing the connection between intuition and cognition might yield better results. Bartels & Urminsky (2011) found that increasing the connection between current and future self by using techniques such as manipulating perceived stability of one's identity decreased

temporal discounting rates. Similarly, Goukens et al. (2009) showed that highlighting one's identity by promoting self-awareness led to more stable preferences and reduced decision biases. We speculate that such treatments may increase the cross-state alignment and reduce overall budget waste. Future research could test this hypothesis.

Furthermore, recent findings suggested that some product attributes have a larger impact on discrepancy in evaluations between intuitive and cognitive judgments. For example taste ratings (for the same products) are different when people are hungry compared with when they are satiated, whereas healthiness ratings do not differ (Fisher & Rangel, 2014). Future research could investigate which product attributes lead to more severe choice inconsistencies and hence to more severe budget inefficiency. These findings could potentially inform us on how different packaging and advertising strategies could contribute to making individuals' choices more optimal.

Future studies could investigate whether certain personality traits may moderate the effect of internal or external cues shifting the balance between intuition and cognition, and hence budget waste, because they chronically make one of the two systems relatively more dominant. Trait self-control may reduce the influence of intuitive judgment, which would lead to fewer discrepancies between the two types of judgment, to less choice inconsistencies, and to less budget waste.

Future research could also shed more light on forecasting errors and budget misuse by assessing the Afriat Index (both individual and overall) of choices made in an intuitive state when in fact making decisions for a cognitive state and vice versa. The findings of such a study could help us to further understand whether and how it is possible to better connect preferences of different types of judgments in order to have a positive influence on the overall rationality. Understanding the ways intuition and cognition can be connected will provide opportunities to improve individuals' welfare.

ESSAY 2: RESOURCE SCARCITY, SOCIOECONOMIC STATUS AND CONFORMITY: THE IMPACT OF RESOURCE SCARCITY ON RESPONSES TO SOCIAL INFLUENCE DEPEND ON CHILDHOOD ENVIRONMENTS

Abstract: Resource scarcity has been found to have a significant impact on peoples' behavior. We investigate whether it also impacts individuals' responses to social influence attempts. Drawing on life history theory we show that the effect of resource scarcity on peoples' responses to social influence depend on childhood economic background. In three studies we find that an environmental stressor like resource scarcity increases conformity among people who grew up in low socio-economic status environments but does not have the same effect among people who grew up in high socio-economic status environments.

Introduction

The economic turmoil of the past years has increased the number of people experiencing financial insecurity (World Health Organization, 2014). Experiencing resource scarcity is a stressful state that can have a significant impact on different aspects of individuals' behavior (Haushofer & Fehr, 2014). One aspect of behavior that has been found to be influenced by stressful and threatening situations is the response to social influence or conformity (Griskevicius et al., 2006). Social influence can have a substantial impact on consumers' decision making (Wood & Hayes, 2012). For instance, social norms are used as tools for changing behaviors such as unhealthy eating, smoking, drug use, gambling, and as marketing tools for making products more appealing in numerous advertising campaigns (e.g. Donaldson, Graham, & Hansen, 1994; Schultz, 1999; Larimer & Neighbors, 2003; Goldstein et al., 2008). Social norms are thus fundamental in the economic fabric, and the question arises as to how resource scarcity may affect conformity. Earlier findings suggest that financial constraints might enhance consumers' sensitivity to social influence (e.g. Christen & Morgan, 2005; Drèze & Nunes, 2011) but it is not clear how general this phenomenon is.

In this paper, we use life-history theory to examine the moderating role of childhood socioeconomic background on the impact of resource scarcity on conformity. Recent studies have suggested that individuals' responses to resource scarcity can be adaptive. These studies used life-history theory to show that behavior of individuals facing adversities such as resource scarcity depends on their childhood socioeconomic background (Ellis, Figueredo, Brumbach, & Schlomer, 2009; Kaplan & Gangestad, 2005; Griskevicius et al., 2013). We begin the paper with an exposition on life-history strategies and their expected influence on conformity under conditions of resource scarcity. We next present the results of three studies testing our predictions.

Life-History Theory

Life-history theory attempts to understand how organisms make use of the available resources to maximize their fitness (Roff, 2002; Stearns, 1992). According to life-history theory, all living organisms face trade-offs with regard to decisions of how to allocate their available resources. Empirical research in various fields such as animal behavior (Ellis et al., 2009), human behavior, and child development (Belsky, Steinberg, & Draper, 1991; Del Giudice, 2009; Hill & Kaplan, 1999) has provided evidence on the existence of life-history strategies.

Life-history strategies vary along a slow-to-fast continuum, in accordance with how individuals resolve life-history trade-offs (Ellis et al., 2009; Figueredo et al., 2005; Nettle, 2010). Slow and fast strategies have their own distinctive features. At a physiological level, faster strategies are associated with earlier development and sexual maturity whereas slower strategies are linked with later development and sexual maturity. With regard to psychological reactions, fast strategies are linked with disregard for future consequences and opportunism whereas slow strategies are associated with long-term planning and delaying gratification with a view to increase future payoffs. These are only a few examples of how life history strategies can influence human behavior.

Adoption of fast or slow strategies, which extends into adult life, is partly determined by specific features of the childhood environment (Belsky, Steinberg, & Draper, 1991; Kuzawa et al., 2010). More unpredictable and harsh childhood environments lead individuals to enact faster strategies, which results in earlier physiological development and sexual maturation (Belsky, Houts, & Fearon, 2010). For instance, environments characterized by higher mortality lead people to have their first child at an earlier age (Griskevicius et al., 2011; Low et al., 2008). Enacting fast strategies associated with immediate reproduction instead of waiting for long-term payouts is evolutionarily adaptive for organisms living in environments

where life span is shorter (Griskevicius et al., 2013; Chisholm et al., 1993). In contrast however, environments involving less unpredictability and harshness favor the enactment of slower strategies associated with delaying reproduction and more parental investment in infants (Ellis et al., 2009).

Recent economic studies showed that early childhood backgrounds are very influential for later adult life of individuals. Heckman et al. (2010a) and Heckman et al. (2013) showed that childhood environments can have a diverging impact on adult outcomes including achievement on education, length of marriage and participation in healthy and criminal behaviors. Malmendier et al. (2011) showed that the condition people face in their childhood can have an impact on their dependence on external funding in their adult life.

The expression of life history strategies

Although physiological changes associated with the adoption of slow versus fast strategies seem fixed through life, psychological changes are more sensitive to situational influences. Recent findings (Griskevicius, et al, 2011) showed that childhood environment can sensitize people to use a specific set of life history strategies; the behavioral tendencies associated with this specific set of strategies are especially likely to emerge in stressful situations. Behavioral tendencies associated with fast and slow strategies may lie dormant in benign conditions. Therefore, adults who grew up in different childhood environments may often behave in similar ways when current levels of stress are low. However, the same individuals are expected to show diverging behaviors when facing stressors in their current adult environment.

Neuroscientific work on animals provides support for the suggestion above (e.g. Bagot et al., 2009; Champagne et al., 2008). Studies showed that adult rats that grew up in a more adverse environment (i.e., low levels of maternal licking and grooming) outperformed those

who grew up in a less adverse environment on learning tasks. This difference was found only in stressful contexts. The results of these studies suggest that early life environments influence neural development and functioning which in adult life is used only in stressful contexts. This is adaptive as life-history strategies are adopted in order to help adult organisms cope with environmental adversities (Bagot et al., 2009; Champagne et al., 2008).

Furthermore, several behavioral studies in humans have provided support for these life history strategies sensitization models (Griskevicius et al., 2013; Griskevicius, et al., 2011; Hill et al., 2013; White et al., 2013). For example, in one study, Griskevicius et al. (2013) showed that reading news articles about the economic difficulties current societies face, low-SES childhoods individuals exhibited responses associated with a faster strategy as they became more risk seeking and impulsive. By contrast, people coming from high-SES childhood environments reacted in a way that can be linked with a slower strategy; the exhibited less risk seeking and impulsive tendencies. In conclusion, people respond to stressors in their current adult environment (such as resource scarcity) by enacting strategies learned throughout their childhood.

Life history strategies and conformity

Conformity is a behavioral strategy designed and targeted to match or imitate the behavior, beliefs and expectations of other individuals (Cialdini & Trost, 1998). Numerous studies have shown that conformity can be highly prevalent (see Cialdini & Goldstein, 2004). In evolutionary literature, conformity is defined as a form of social learning (Boyd & Richerson, 1985). According to that literature, individuals have two different ways to acquire information: individual learning in which humans acquire information through experimentation and trial-and-error, and social learning which involves the acquisition of information by copying others (Boyd & Richerson, 1985, 1988; Toelch et al., 2008).

Individual and social learning are usually used adaptively by humans as they both have advantages and disadvantages. Individual learning is more costly and time consuming as it involves more effort and requires more resources, but it tends to be more accurate and reliable. On the other hand, social learning is less costly but also less accurate and reliable (Boyd & Richerson, 1985; Laland, 2004). Individuals use both types of learning interchangeably depending on which type of strategy is more suitable to the circumstances they live in.

Harsh and unpredictable environments are characterized by increased dangers and mortality. In addition, available resources are limited, therefore, in those environments organisms have limited energy to spare (Ellis et al., 2009). This makes the acquisition of information through individual learning difficult and in many cases dangerous. When information is highly costly to be acquired with individual learning, individuals turn to social learning to acquire information (Boyd & Richerson, 1998; McElreath et al., 2005; Morgan et al., 2011). On the other hand, in less harsh environments, resources are more abundant, and risks and mortality are less salient. In more benign situations, individual learning can be an adaptively more efficient strategy as it is considered to be more accurate and might therefore yield better results (Boyd & Richerson, 1998; McElreath, R. et al., 2005; Morgan et al., 2011). As a result, we expect individuals raised in harsh childhood environments (where individual learning is too costly) to be sensitized to acquire information through social learning, while we expect people raised in less harsh environments to be sensitized to be more independent and use less social learning.

Some recent findings provide some preliminary support for our expectations. Observational studies show that lower SES children play in closer proximity to other children, relative to high SES children (Scherer, 1974; Stipek & Ryan, 1997). Moreover, Kraus and Keltner (2009) show that low SES people pay more attention to social context than high SES

individuals, and are more motivated to behave in ways that increase social interaction and connection with others. This expectation is consistent with earlier findings showing that high SES people have a greater sense of agency than low SES individuals. High SES individuals also place greater value on their own choices and preferences than low SES individuals (Snibbe & Markus, 2005; Stephens, Markus & Townsend, 2007).

In conclusion, we expect that individuals who grew up in low SES environments will have been sensitized to acquire information more through social learning and thus will be more susceptible to conformity (cf. Boyd & Richerson, 1985), whereas people who grew up in high SES environments will have been less sensitized to acquire information through social learning and thus will be less likely to use strategies such as conformity. Given earlier findings that behavioral tendencies associated with a specific set of strategies are especially likely to emerge in stressful situations (Griskevicius et al., 2011), we expect behaviors associated with the use of social learning as life-history strategies to manifest themselves in conditions of resource scarcity.

In three studies, we show that resource scarcity cues indeed lead people coming from poor backgrounds to behave in a more conformist way, whereas these cues do not have an impact on rich peoples' tendencies to conform.

Study 1

The goal of the first study was to test our hypothesis with well-established measures and manipulations of the three core variables.

Method

Participants

Five hundred and fifty three participants were drawn from Crowdflower (317 female, M_{age}=38.07, SD=12,62). They received a small monetary fee as a compensation.

Procedure

Participants were randomly assigned to one of two threat conditions: a resource scarcity or a control condition. In both conditions, participants read an article that, so they were told, recently appeared in a popular newspaper. In the resource scarcity condition, the article described the highly uncertain economic climate (e.g. Griskevicius et al., 2013). In the control condition, participants read an article (similar in length and style) that described a person who lost track of his father in a metro station. Results of a pretest showed that the article in the economic uncertainty condition elicited feelings of resource scarcity more than the article in the control condition.

Conformity was assessed in the following way. We presented participants with a description of a product (cereals) together with the average consumer rating from a popular online store. The average rating was relatively high: 9.25 out of 11. Then participants were asked to rate how much they liked the product and how useful they found it (1 not at all; 11 extremely) (Galinski et al., 2008). Conformity was assessed by checking how highly participants rated the product, with higher ratings indicating more conformity.

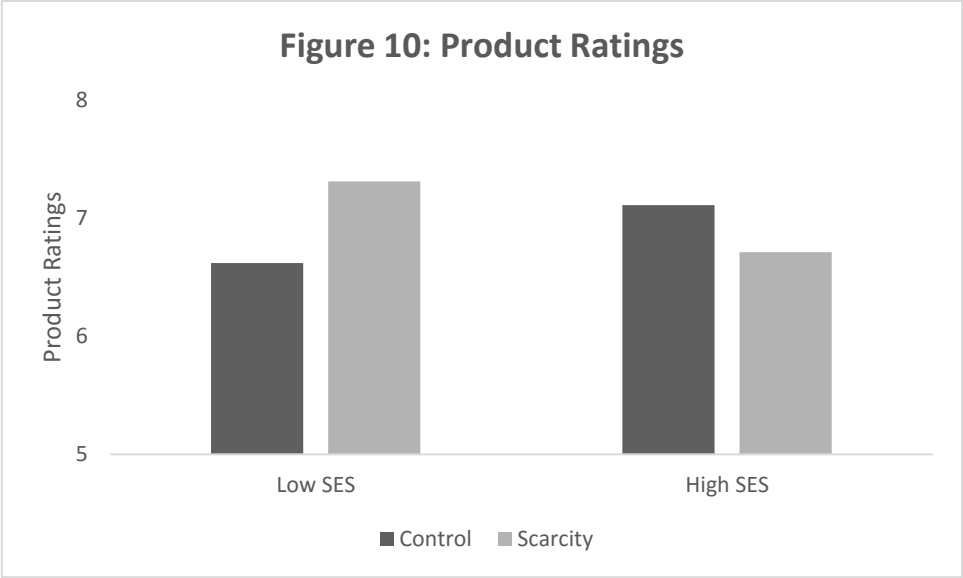
Perceived childhood and current SES were assessed using established measures (Griskevicius et al., 2011). Participants were asked to indicate their agreement with six statements on a 9-point scale (e.g. “My family usually had enough money for things when I was growing up”). In line with previous studies, none of our findings were significant when

we used current SES instead of childhood SES (e.g. Griskevicius et al., 2013); therefore these results were omitted from our analysis.

Results and discussion

A regression predicting the ratings from the resource scarcity cue, childhood SES, and their interaction showed a significant resource scarcity × childhood SES interaction, $t(549) = -2.97$, $p = 0.003$, $\beta = -0.355$). Following previous studies measuring childhood SES (Griskevicius et al., 2011; Aiken & West, 1991), we conducted a spotlight analysis at one standard deviation (SD) above and below the mean of childhood SES. Spotlight analysis is a post hoc test used in regression to analyze interactions. The simple slopes of one independent variable are examined at specific values of the other independent variable (one SD below and above the mean). In essence spotlight analysis recalculates the effect of the one independent variable (in our case resource scarcity cues) two times; one as if all participants would score one SD below the mean of childhood SES and another one as if all participant would score 1 SD above the mean of childhood SES. Results indicated that resource scarcity made individuals who grew up relatively poor (one SD below the mean) conform more, as they rated the product significantly higher ($t(549) = 2.741$, $p = 0.006$, $\beta = 0.710$) than low SES individuals in the control condition. However, for people from high-SES backgrounds (+1 SD), resource scarcity reduced conformity but ratings were not significantly different in the scarcity condition than in the control condition, $t(549) = -1.462$, $p = 0.144$, $\beta = -0.400$ (see Figure 10).

The first experiment showed that resource scarcity cues had a different effect on conformity depending on the economic conditions under which people grew up. People who grew up relatively poor responded to resource scarcity cues by conforming. This was not the case for individuals who grew up relatively rich.



Study 2

Because financial crises hit people not just collectively but often differentially, we wanted to assess whether the effect of Study 1 would replicate using an individual financial constraint as an actual stressor. We also wanted to verify that the results in study 1 were driven by tendencies to conform rather than just resulting from a change in preferences trigged by the resource scarcity cues. We therefore added a condition in which we provided participants with negative consumer reviews of the product.

Method

Participants

For the second study, nine hundred and ninety participants were drawn from Crowdflower (618 women, Mage=38.70, SD=12.54). They received a small monetary compensation.

Procedure

To prime resource scarcity we used a manipulation designed by Zhou, Vohs & Baumeister (2009). In the scarcity condition participants were asked to list their monetary

expenditures from the past 30 days, whereas in the control condition participants were instructed to write about the weather conditions during the past 30 days. Conformity was assessed after presenting participants with the same description of a product (cereals) as in study 1, together with consumer review scores from a popular online store. The average consumer reviews were either positive (9.25 out of 11) or negative (2.58 out of 11). Childhood and current socioeconomic background were assessed the same way as in study 1.

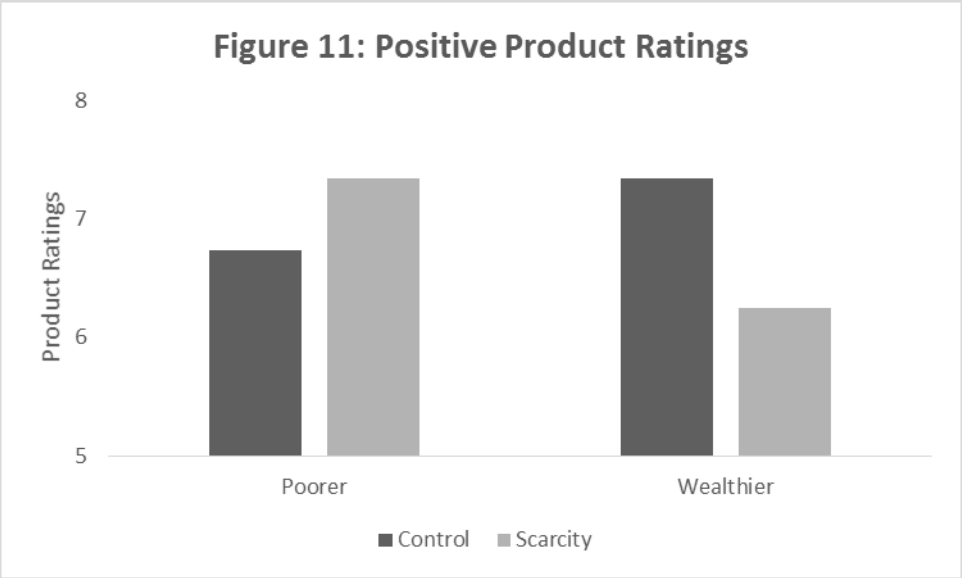
Results and Discussion

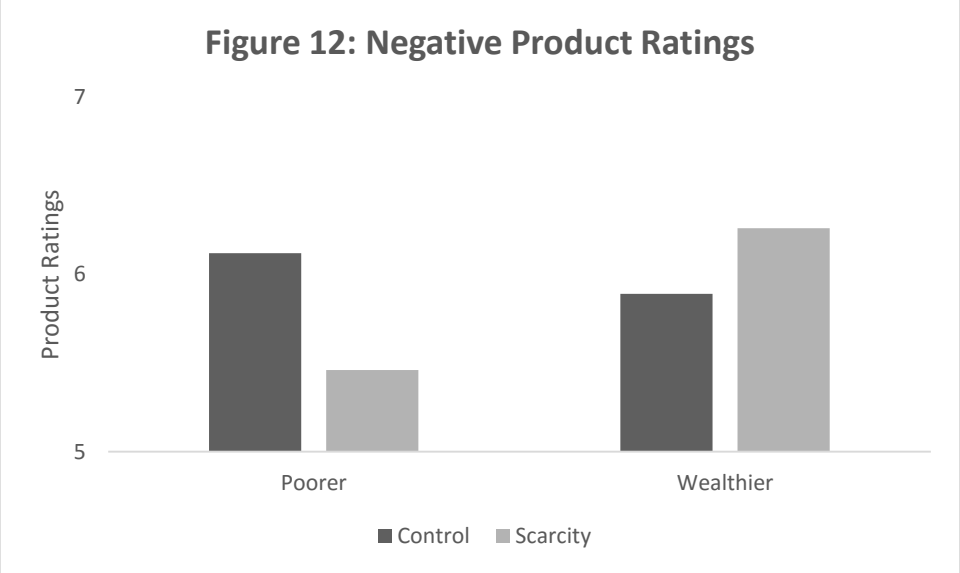
For the positive ratings (see Figure 2), findings showed the same pattern as in study 1. The interaction between childhood SES and financial deprivation was significant ($t(472) = -3.866$, $p < 0.001$, $\beta = -0.468$). For those from low-SES backgrounds (−1 SD), resource scarcity increased conformism ($t(472) = 2.001$, $p = 0.045$, $\beta = 0.604$), as participants in the resource scarcity condition rated the product significantly higher than low-SES individuals in the control condition. For those from high-SES backgrounds (+1 SD), scarcity not only failed to increase conformism but even significantly decreased it ($t(472) = -3.371$, $p < .001$, $\beta = -1{,}751$) as it made people rate the product lower.

For the negative ratings (see Figure 12) we again observed that the interaction between childhood SES and scarcity was significant ($t(510) = 2.091$, $p = 0.037$, $\beta = 0.276$). Resource scarcity made low SES people rate the product significantly lower ($t(510) = -2.136$, $p = 0.033$, $\beta = -0.659$), indicating a higher degree of conformity, whereas the same cue did not have an impact on high SES people ($t(510) = 1.011$, $p = 0.312$, $\beta = 0.366$).

Our second study replicates the results of the first study, and extends them for individually afflicted resource scarcity and negative consumer reviews. We observed that for both negative and positive ratings, resource scarcity made people from poor backgrounds

relative conformists, whereas it did not have the same effect on people from rich backgrounds.





Study 3

In the third study we sought to gather field evidence for our effect, as well as investigate the extent to which our findings are generalizable across cultures. Therefore, we analyzed data from the World Values Survey, which aims to explore people's values and beliefs around the globe. The World Values Survey combines nationally conducted surveys in 77 countries. We

analyzed data collected in the last wave (wave 6) of the survey (World Values Survey Association, 2014).

Method

Participants

The study included seventy eight thousand and nine hundred and twenty one participants from the sixth wave of the World value survey (40616 women, M_{age}= 41.56, SD = 16.26).

Measures

As a proxy for childhood SES we used an item measuring the income group participants indicated they currently belonged to (1 lowest group – 10 highest group). Although in our experiments and small samples we failed to observe effects for current SES instead of childhood SES, recent findings show that in large datasets current SES can serve as a good proxy for childhood SES, and as a result also for the adoption of different life-history strategies (Griskevicius et al., 2011).

As a measure of resource scarcity threats we used an item measuring participants' satisfaction with the financial situation of their household (1 = Completely Dissatisfied – 10 = Completely Satisfied; reversed scaled). Financial dissatisfaction has been used by several studies in the past as a proxy for perceived resource scarcity (e.g. Haisley, Mostafa & Loewenstein, 2008). Individuals (even when objectively wealthy) can experience dissatisfaction and feelings of resource scarcity when comparing their financial states to those of wealthier counterparts and/or to their own states during more wealthy times (Sharma & Alter, 2013). The correlation between scales of current income and financial satisfaction was moderate (r=0.34). We checked for multicollinearity problems between both variables, but found none (VIF=1.13).

As a conformity measure we chose an item probing for participants' perceived similarity to a person who considers it important to always behave properly; to avoid doing anything other people would say is wrong (1 = Not at all like me– 6 = Very much like me; reverse scaled). This item had been taken from Schwartz's (2012) Value Survey and was designed to measure individuals' tendency to conform. In our analysis, we reversed the scales for items measuring financial satisfaction and conformity.

Results and discussion

A regression showed that the interaction between the proxy for childhood SES and financial dissatisfaction (resource scarcity) on the dependent variable (conformism) was significant ($t(78917) = -4.84$, $p < 0.001$, $\beta = -0.004$). In line with our hypotheses, financial dissatisfaction significantly increased poor participants' tendencies to conform ($t(78917) = 6.51$, $p < 0.001$, $\beta = 0.02$). For those from a rich background however, financial dissatisfaction did not have an effect on their tendencies to conform ($t(78917) = 0.25$, $p = 0.80$, $\beta = 0.002$). Additionally, we run complementary regression analysis by including some important control variables (gender, age, education) to check the robustness of our findings. The analysis yielded again a significant interaction between SES and financial satisfaction ($t(78224) = -4.87$, $p < 0.001$, $\beta = -0.004$). The third study replicates the results of the previous studies in a multicultural field setting and with different measures, and thus increases the reliability and generalizability of our results.

General Discussion

Normative information has been found to have a significant impact on consumers' decision making (Goldstein, Cialdini & Griskevicius, 2008; Wood & Hayes, 2012). The present study provides an answer to the question as to whether resource scarcity leads

individuals to conform to normative information. Findings of three studies showed that resource scarcity had a markedly different effect on conformity depending on whether people reported having grown up in a relatively resource-scarce or resource-abundant environment. For people who grew up in relatively resource-scarce environments, resource scarcity cues increased conformism. Resource scarcity cues did not increase conformism in people who grew up in relatively resource-abundant environments, however.

The fact that exposure to specific childhood environments had the observed differential effects on conformity is consistent with the notion that social learning can be more useful and adaptive when acquiring information through individual learning is difficult. Individual learning however can be more useful in environments where the cost of exploration and experimentation for acquiring information is not so high (Boyd & Richerson, 1998; McElreath et al., 2005; Morgan et al., 2011).

Conformity has historically been found to be a significant variable in the social psychology literature (Cialdini and Goldstein, 2004). Furthermore, recent findings show the existence of conformity in animals (Whiten et al., 2005; Dindo et al., 2009; Pike & Laland, 2010). However, the answer to the question as to how widespread conformity can be and whether some individuals deviate from the norms more than others is still not clear (Henrich & Boyd, 1998; Kendal et al., 2009; Morgan & Laland, 2012). Some scholars argue that the level of conformity depends on social motives (e.g. Cialdini & Goldstein, 2004; Griskevicius et al., 2006), whereas other studies argue that it depends on individual differences (Efferson et al., 2008). We propose that one important variable that provides additional insights in the debate on the level of conformity is socioeconomic background.

The findings of our experiments are the first to connect conformity with a specific set of life-history strategies. We call upon future research to explore the effects of life-history strategies on conformity further. Future research could for instance try to replicate the results

using different threat cues (e.g. mortality cues) and measuring childhood SES in different ways (e.g., recall of objective household income during childhood). Literature on life history strategies finds that people sensitized in a specific set of strategies use them after being primed with extrinsic resource scarcity cues. To our knowledge, the present study is the first to also use more intrinsic manipulations of resource scarcity (i.e., feelings of personal financial deprivation; studies 2 and 3). Our results suggest that intrinsic resource scarcity cues can also trigger life history strategies. Future research could investigate whether the findings of our study hold for other types of intrinsic resource scarcity cues such as hunger.

Our studies tested the effect of resource scarcity cues on individuals' tendencies to conform with social suggestions or norms that can be characterized as descriptive. Descriptive norms usually involve perceptions of the type of behaviors typically performed. Future endeavors could investigate our proposed effect for norms that are more injunctive such as lay theories. Future research could also try to extend our findings by testing other factors that could have a different impact such as the level of individuals' expertise on the topic of the norm, the salience of the norm, the level of uncertainty of the norm, and the extent of identification with the reference group.

Our findings have some useful implications for marketers and policy makers. They show that persuasion efforts using normative social suggestions might not yield the expected results under certain circumstances. For example, advertising messages and campaigns containing environmental harshness cues coupled with normative suggestions might be ineffective for some individuals. Furthermore, in times of economic recessions where a big part of the population experiences resource scarcity, persuasions efforts including social influence cues could prove unproductive for that part of the population that has been raised in a relatively rich environment. Hence, such efforts should be targeted to low childhood SES individuals more directly.

The present research addressed the question as to how individuals who experience resource scarcity behave towards social norms. We propose that this effect depends on childhood socioeconomic environment. We use life-history theory which dictates that individuals get sensitized to a specific set of strategies during childhood, which they use later in life whenever they feel threatened. These strategies are not “good” neither “bad”. As life history theory suggests, they are adaptive. Behaviors associated with the different strategies are simply outcomes of mental mechanisms designed to adapt optimally to life’s circumstances.

ESSAY 3: AN INVESTIGATION INTO THE EFFECT OF MATING TACTICS ON ECONOMIC RISK-TAKING

Abstract: Every day individuals are called to take financial decisions that involve an element of risk. Numerous studies have tried to explain why individuals choose to incorporate or not this element of risk in their decision making process. In line with recent taking a more evolutionary perspective on the topic we suggest that differences in mating tactics can be an important variable influencing risk-taking. In two experiments we show that the level of financial risk-taking depends on the type of mating tactics people choose to adopt. Specifically, we find that when mating goals are salient financial risk-taking decreases for individuals adopting long-term mating tactics but not for individuals adopting short-term tactics.

Introduction

Each day, individuals make financial decisions large and small, many of which involve an element of risk. A body of the literature suggests that risky decision-making is influenced by emotions, goals, and other drive states (Baker & Maner, 2009). Although research has provided a psychologically more proximate account (how it is happening?) for variables influencing risky decision-making, many studies fall short of identifying the underlying social functions that risk-taking serves. Providing a more ultimate explanation (why it is happening?) on the reasons behind risky decision making is important in order to understand decision making better and help individuals improve their decision making. Recent studies taking a more evolutionary perspective suggest that financial risk-taking is connected with individual differences that are tied to more fundamental motives (e.g. self-protection and reproduction; Griskevicius & Kenrick, 2013). In line with recent findings we propose that differences in mating tactics can be an important variable influencing risk-taking.

Mating is universal in human societies and one of the main drivers of human behavior (e.g. Buss & Schmitt, 1993; Gangestad & Simpson, 2000). The duration of a mating relationship is not always long-term, it can range from few hours to several decades. Evolutionary theories on human mating argue that individuals have two main mating tactics, "long-" and "short-" term tactics (e.g. Buss & Schmitt, 1993; Gangestad & Simpson, 2000). This flexible mating design allows individuals to respond adaptively in a wide variety of circumstances. Mating strategies have been found to have a highly significant impact on the decisions which are directly associated with reproduction, for instance the choice of partner (Simpson & Gangestad, 1992). Recent findings show that mating strategies can have an influence on decisions which are of a more economic nature and not directly linked to reproduction, such as conspicuous consumption and bet-hedging (Sundie and colleagues,

2011; Durante & Arsena, 2014). Building on the findings of previous studies we show that mating tactics have an impact on financial risk taking.

We organize the article as follows. First, we review the literature on mating tactics and their impact on decision making. Next, we report the findings of our two studies. Last, we conclude with the discussion of our results and their implications.

Risk-Taking Preferences

In economics risk-taking is usually defined in terms of the variance of possible monetary outcomes. It is defined as the preference for a higher variance payoff given the fact that the expected value is constant (Schonberg, Fox & Poldrack, 2010). One of the first studies assessing financial risk-taking in individuals found that individuals are generally risk averse (Pratt, 1964). Specifically it found that when individuals compare sure payment to an option that involves risk with equal or even higher expected value, they prefer the sure payment. This aversion towards risk explains why individuals usually prefer higher returns for more risky investments.

However, recent research has shown that there are plenty of variables that can change individuals' preference towards risk. Several motivational or contextual factors have been shown to have an impact on risk-taking. Emotions can alter risk preferences. For example feeling angry (Lerner & Keltner, 2001) or powerful (Inesi, 2010) lead to more risk taking. Visceral influences can potentially also have a significant effect on risk preferences (Ariely & Loewenstein, 2006; Ditto et al., 2006; Baker & Maner, 2008). Ditto et al., (2006) increased people's risk-taking by making them feel hungry. Last, personality traits such as low self-control, impulsivity and sensation-seeking have been associated with more risk preferences (Zuckerman, 2007).

From an evolutionary perspective, one of the main functions of risk-taking behavior is to enhance one's ability to attract a mate (Baker & Maner, 2008). This includes risk-taking behaviors that are directly related to gaining sexual access to the opposite-sex (such as sexual risk-taking), but also behaviors that are not directly linked with mate-seeking per se (such as reckless driving or gambling) but that are beneficial to one's reputation and thus enhance one's access to more mates (e.g. males might try to impress potential female mating partners by risky driving maneuvers or taking high risk gambles; Greitemeyer, Kastenmüller & Fischer, 2013). In line with costly signaling theory (Zahavi, 1975), evolutionary literature proposed that individuals may engage in risky behaviors that are potentially costly as a way of signaling to others that they possess desirable characteristics (Baker & Maner, 2009). In fact, according to Kelly & Dumbar' study (2001) females appear to be attracted by males' risk-taking. According to their results females rated men taking physical risks as more attractive than men avoiding risk-taking.

Based on those theories, several studies have shown that sexual stimuli can increase the level of financial risk-taking (Baker & Maner, 2008; Baker & Maner, 2009; Greitemeyer, Kastenmüller & Fischer, 2013). However, none of these studies has shown how deeper motives in mating such as the preferences for more short- or long-term relationships can influence the levels of risk seeking. We fill this gap in two studies.

Differences Between Short- and Long-Term Strategies

Mating alliances between men and women are universal. Almost every known society has formal mating alliances between males and females (Buss & Schmitt, 1993). However, the duration of a mating alliance can vary significantly, from a few hours till several decades. In general, the gender that usually exhibits more promiscuous, short-term mating tactics is male as men invest less in offspring (Oliver & Hyde, 1993; Schmitt, 2005). Men have

benefited more than women from adopting short-term mating tactics. A man mating with 50 different women in a year would have more offspring than a woman mating with 50 different men in the same period. As a result, men are much more willing than women to engage in sexual relations (Clark & Hatfield, 1989).

Despite the robust gender difference in preference for short-term mating tactics, there is a considerable within-sex variation in preference for short- or long-term mating (Schmitt, 2005). Although men and women both vary with respect to mating tactics, the implications of this variation usually are different for each gender. Despite the fact that long-term mating tactics are more fit for females, a woman can reap benefits from short-term mating tactics (Wolff & MacDonald, 2004). Women who engage in short-term mating can obtain immediate resources or protection, ensure their reproduction if her long-term mate is infertile, and gain access to high-quality genes by short-term mating with a man who is not her long-term mate (Buss & Schmitt, 1993). Similarly, men can also benefit by pursuing more long-term tactics. Long-term mating may help men to increase the survival chances of their offspring in demanding environments, to obtain women of high mate value (for example more healthy and fertile women) and to solve the problem of concealed ovulation (Buss & Schmitt, 1993; Schmitt, 2005). Furthermore, long-term tactics might be a good fit for men that do not have the attributes women desire in short-term mates (for example high social status).

Mating Tactics and Decision Making

As expected, mating tactics have a profound effect on decisions that are directly linked to mating. Individuals adopting short-term strategies have a more positive attitude towards casual sex and are more experienced in casual dating than people adopting more long-term tactics (Buss & Schmitt, 1993). Furthermore, short-term oriented individuals have been found to engage in unprotected sex more often than more long-term oriented individuals (Seal & Agostinelly, 1994). When it comes to mate choice, people adopting short-term strategies have been found to value physical attractiveness and sex appeal while people adopting long-term tactics place more weight on characteristics like good personal and parenting qualities, such as being kind, affectionate, responsible and loyal (Simpson & Gangestad, 1992). In line with these preferences, short-term oriented individuals have been found to acquire partners who are more socially visible and more physically/sexually attractive. Conversely, long-term oriented people were found to be involved with partners who are more affectionate, faithful, responsible and committed to the relationship (Simpson & Gangestad, 1992).

Recent findings show that mating tactics can have an influence on decisions which are of more economic nature and not directly linked to reproduction. Durante & Arsena (2014) found that women employing short-term tactics prefer more variety when it comes to product choice. Specifically, women adopting short-term tactics select more unique options from consumer product sets than women adopting more long-term tactics. Furthermore, Sundie and colleagues (2011) showed that short-term mating tactics led men to consume more high status products as opposed to long-term tactics. Their findings show that short-term tacticians engage in conspicuous consumption more often than long-term strategists.

One important variable for the emergence of mating strategies, and as a result for their impact on decisions, is the salience of the mating goals. In decisions directly linked to mating such as partner choices, mating goals are salient as the decision itself involves mating goals.

However, for decisions that are not directly linked to mating, these goals have to be activated by a cue (either external or internal). Indeed, all the differences in more economic decisions between short- and long-term strategists were found after mating goals were activated. In Durante & Arsena's study the difference in variety seeking between short-term and long-term oriented women was found for participants that were in the fertile days of the menstrual cycle (during ovulation); when mating goals are more active. In Sundie et al.'s study the difference in conspicuous consumption was found after showing male participants pictures of attractive women.

Mating Tactics and Financial Risk-Taking

Taking highly uncertain gambles is often considered to be irrational from a classic economic perspective, however, choosing to gamble can sometimes be an optimal strategy when expected profits from safer choices are negligible (e.g., Kacelnik & Bateson, 1996). From an evolutionary perspective, the main function of risk-taking behavior is to enhance individuals' ability to attract a mate, as risks can provide fast gains in monetary and non-monetary terms (e.g. status and reputation; Greitemeyer, Kastenmüller & Fischer, 2013). However, risk taking is not always the optimal strategy to acquire a mate. Baker & Maner (2008) show that risk-taking is used in situations in which social dominance, confidence, or ambition have to be displayed. However, in situations in which other characteristics (such as reproduction value) lead to mate acquisition risk-taking is not used as a strategy.

Similarly, we expect that different mating tactics will lead to different levels of preferences for risk-taking, as every tactic has different pathways that lead to mate acquisition. One of the main characteristics of short-term tactics is the involvement in a relatively high number of mating relationships. Searching for more than one possible mate leads to a high level of intersexual competition. Short-term oriented individuals have to

compete with other short-term oriented individuals for the acquisition of the highest number of mates. Baker & Maner (2009) found that higher levels of intersexual competition lead to higher levels of financial risk-taking. Furthermore, it has been found that people adopting short-term tactics value social visibility and high status (Simpson & Gangestad, 1992). As it was pointed out above, risk-taking is an optimal strategy when social visibility and status provide an edge in mate acquisition (Baker & Maner, 2008). Findings show that short-term oriented individuals are more sensitive towards risk-taking behaviors such as unprotected sex (Seal & Agostinelly, 1994). Therefore, we expect people adopting short-term strategies to prefer more risky options.

On the other hand, long-term tactics are based on characteristics such as stability and investment in the relationship and its potential outcomes (e.g. offspring). Individuals adopting more long-term mating tactics value more stability and have been found to invest more in the quality of their offspring (Griskevicius et al., 2013). As a result it makes sense that those individuals will be oriented towards more stable and safe ways of acquiring resources. Furthermore, indications of an individual's willingness to invest her/his resources wisely and within a committed partnership can be a crucial characteristics of one's long-term attractiveness (Sundie et al., 2011). Griskevicius et al. (2013) found that individuals exhibiting higher levels of family investment preferred more safe financial options. Therefore, we expect that individuals adopting long-term strategies will have a preference towards less risky options.

Taken all together we expect that differences in mating tactics will lead to different levels of financial risk taking. In line with previous studies on mating tactics and economic decision making we expect to find this difference only when mating goals are salient. We conduct two studies to test our prediction.

Study 1

The goal of the first study was to test our hypothesis with well-established measures and manipulations of the three core variables (mating tactics, mating goal salience and financial risk-taking).

Method

Participants

One hundred and seventy heterosexual male participants were recruited from Mechanical Turk (M_{age}=38.78, SD=11,74).

Procedure

Mating goal salience prime: Participants were instructed that they would have to rate 15 pictures that would be used in an advertising campaign. In the 'mating goal salience' condition, 15 pictures of non-nude female models were shown. These models assumed different poses and wore diverse outfits, but all were dressed in a sexually appealing manner (e.g., swimsuit or lingerie). In the control condition, the photographs contained models who were displayed with relatively modest, unrevealing clothing (Van den Bergh, Dewitte, & Warlop, 2008).

Risk-taking Task: To assess financial risk-taking, we invited participants to take part in a seemingly unrelated gambling study which included two hypothetical lottery options (Duclos, Wan & Jiang, 2014). Option A (relatively safe alternative) offered an 80% chance of winning $200 and a 20% of winning nothing (high odds/low reward) whereas option B (riskier alternative) offered 20% chance of winning $800 and an 80% chance of winning nothing (low odds/high reward). After considering this information, participants were to

report their relative preference between the two options on a 8-point scale (1 - I strongly prefer option A and 8- strongly prefer option B).

Mating Tactics: Last, mating tactics were assessed by means of the Sociosexual Orientation Inventory (SOI; Simpson & Gangestad, 1991). SOI consists of five self-report indices: (a) number of different sex partners in the past year; (b) number of different sex partners foreseen in the next five years; (c) number of times having engaged in sex with someone on one and only one occasion; (d) frequency of sexual fantasy involving partners other than the current one (responded to on an 8-point scale, where 1 = never and 8 = at least once a day); and (e) three aggregated items assessing participants' attitudes toward engaging in casual, uncommitted sex (e.g., "I can imagine myself being comfortable and enjoying casual sex with different partners"; answered on 9-point scales, where 1 = strongly disagree and 9 = strongly agree). Following Simpson & Gangestad (1991), we used a set of simple weights to obtain a unit-weighted index, as follows: SOI = 5 × (no. of partners in the past year) + 1 × (no. of partners foreseen) + 5 × (no. of one-night stands) + 4 × (frequency of sexual fantasy) + 2 × (attitudes toward engaging in casual, uncommitted sex). Higher scores indicate an unrestricted sociosexual orientation and the adoption of short-term mating tactics, whereas lower scores indicate restricted sociosexual orientation and the adoption of long-term mating tactics.

Results

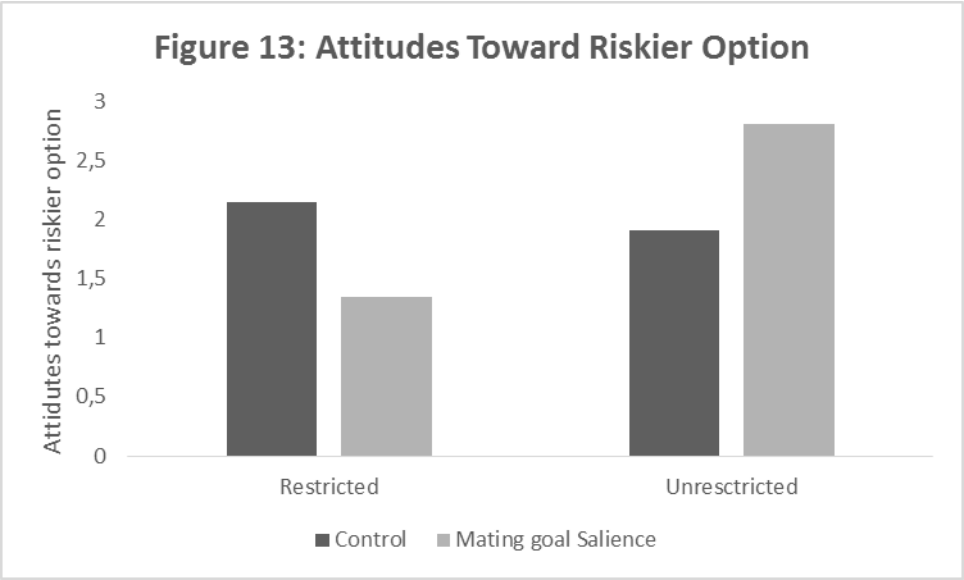
Using the Tobit model we regressed attitudes towards the riskier gamble against mating goal salience prime (dummy variable, 0=control, 1=mating goal salience) and sociosexuality (continuous variable). The analysis showed that there was a main effect of mating prime ($t(169)= -2.060$, $p=0.041$, $b=-1.963$) but showed no effect of sociosexuality ($t(169)=0.121$, $p=0.859$, $b=0.180$). Most importantly, it showed that the interaction between the mating prime

and sociosexuality was significant (t(169)=2.420, p=0.010, b=0.034) and positive. This means that when a mating goal was salient, higher (lower) levels of sociosexuality led to higher (lower) levels of risk taking. We rerun the analysis adding childhood socioeconomic background as a control variable (childhood SES was assessed using established measures; Griskevicius et al., 2011). The interaction between mating cues and SOI remained significant (t(169)=2.420, p=0.017, b=0.034).

Furthermore we conducted a spotlight analysis to investigate which part of the population drives the results[1]. The spotlight analysis one SD above and below the mean of SOI showed that the effect was mainly driven by the restricted individuals. The mating goal prime made those individuals prefer the riskier option significantly less (t(169)=-1.959, p=0.052, b=-0.803). For the unrestricted participants, although the effect of the prime was positive (they chose the riskier option more) it was not significant (t(169)= 1.517, p=0.131, b=0.875).

The findings of our first experiment show that different mating tactics lead to different levels of risk taking. They also show, surprisingly, that the effect is mainly driven by the sexually more restricted individuals (long-term mating tactics). According to our findings those individuals prefer safer options when their mating goals are active.

[1] Although the structure of the data for the dependent variable is not linear previous studies (Duclos, Wan & Jiang, 2014) have used linear models (like spotlight analysis) to analyze the data of the specific variable.



Study 2

In study 2 we sought to replicate the findings of the first study using a different way of assessing financial risk-taking.

Method

Participants

One hundred and one heterosexual men were recruited from Mechanical Turk (Mage=39.96, SD=11.09).

Procedure

The manipulation of mating goal salience and the assessment of mating goals were the same as study 1.

Risk-taking task: Participants received a risk preference questionnaire based on Holt & Laury (2002), involving 10 choices between pairs of two-outcome lotteries, A and B. In lottery A the possible outcomes were $16 and $20 (low variance–low risk). In lottery B the possible outcomes were $1 and $38.50 (high variance–high risk). The probability of receiving

the larger payoff increased systematically from pair 1 to pair 10. The expected value initially favored lottery A (pair 1-4) but reversed at decision 5, favoring lottery B (see Table 14). With the exception of participants who strongly favor risk-taking and as a result would select lottery B throughout the 10 pairs, the choice profile of a coherent decision maker would begin by choosing lottery A and would shift at some point to lottery B. A risk neutral participant would switch from A to B at decision 5. Higher switching points indicate greater risk aversion. A risk taking score was derived from the number of the choice at which they first chose Lottery B. As in previous studies using this measure, participants that deviated from a coherent choice pattern were excluded. We interpreted a response pattern in which, for example, a participant chose the high-risk lottery when it had a 5/10 chance of winning and then rejected it when it had a 7/10 chance of winning as indicating either misunderstanding of the task or inattentive responding. A total of 19 (approximately 16% of the sample) participants were excluded on this basis.

Table 2: Risk-Taking Task

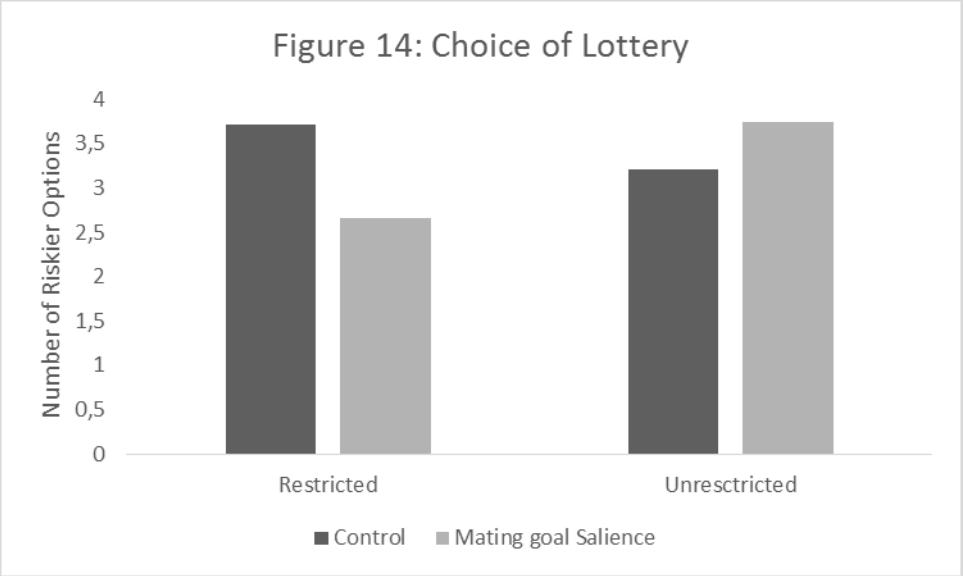
	Lottery 1		Lottery 2	
Decision	Probability of winning 20$	Probability of winning 16$	Probability of winning 38.5$	Probability of winning 1$
1	10%	90%	10%	90%
2	20%	80%	20%	80%
3	30%	70%	30%	70%
4	40%	60%	40%	60%
5	50%	50%	50%	50%
6	60%	40%	60%	40%
7	70%	30%	70%	30%
8	80%	20%	80%	20%
9	90%	10%	90%	10%
10	100%	0%	100%	0%

Results

The regression predicting the number of times participants chose the riskier option from mating goal salience prime and sociosexuality showed that there was not a main effect of

mating prime (t(101)= -0.5730 , p=0. 568, b=-0.261) or sociosexuality (t(101)= 0.538 p=0.591, b=0.021). As predicted however, the interaction between the mating prime and sociosexuality was (marginally) significant (t(101)= 1.971, p=0.051, b=0.015) and positive. Once again the results show that when mating goal was salient, higher (lower) levels of sociosexuality led to higher (lower) levels of risk taking. A spotlight analysis showed again that the effect was again mainly driven by the restricted individuals. The mating prime made restricted individuals prefer the riskier option a marginally significantly smaller number of times (t(101)= -1.768, p=0.080, b=-1.055). In contrast, the prime had a positive effect for the unrestricted, but the effect was not significant (t(101)= 0.8633, p=0.391, b=0.534).

The findings replicate the results of the first study. Once again we find that different mating tactics lead to different levels of risk taking when mating goals are salient. Once again the effect is mostly driven by the sexually restricted individuals who prefer to choose less risky options.



General Discussion

Financial risk-taking is a behavior with important implications for people's welfare. Hundreds of studies have tried to investigate and interpret why people take financially risky decisions, which in some occasions are considered highly irrational. The results of our two studies show that financial risk-taking might be connected with some more fundamental decisions on people's lives such as reproduction and resource allocation. Our results imply that individual differences on the attitudes towards the investment on a romantic relationship can have an impact on the levels of financial risk-taking. Our findings show that the level of financial risk-taking depends on individuals' preferences for short-term or long-term romantic relationships when mating goals are salient.

Our results suggest that financial risk-taking is linked with more strategic decisions such as the time and effort each individual is willing to invest in a romantic relationship. Our findings are consistent with a nuanced understanding of how human mating tactics reflect general principles of parental investment and resource allocation. Humans can and do follow different sexual strategies. Some individuals follow a low-parental investment strategy by investing in the pursuit of multiple short-term sexual partners. Other humans follow a high-parental investment mating strategy by investing more effort, time, and money in a primary mate and any offspring resulting from that partnership. These differences in turn have an impact on peoples' preferences on ways of gaining resources.

Our findings are in line with the idea that people who invest more resources in a romantic relationship prefer more safe, steady ways of obtaining resources. Previous findings suggest that there are several possible reasons behind this risk averse behavior. One possible reason is that these individuals search for safe ways to secure the resources for the extra investment they have to make in order to ensure the success of their chosen tactic (Griskevicius et al., 2013). Another possible reason is that they use this low risk behavior as a

signal to potential mates. People adopting long-term mating tactics have been found to value stability and responsibility as main characteristics in mates (Simpson & Gangestad, 1992). Therefore risky behavior might not be the optimal signal strategy for long-term strategists to attract other long-term mates. Future research can try to further clarify the reasons underpinning the risk averse behavior of people adopting long-term mating tactics.

Our findings show that mating cues made restricted sociosexuals (long-term tacticians) take less risks. However, mating cues did not have an impact on the unrestricted ones (short-term tacticians). Although for those individuals mating cues created a trend towards more risk-taking, it was not statistically significant. This is quite surprising as several studies have shown that mating cues made men, who are the more sociosexual gender, more risk seeking (Baker & Maner, 2008; Baker & Maner, 2009; Greitemeyer, Kastenmüller & Fischer, 2013). A possible explanation is that the environment in our experiments was not competitive enough for the unrestricted individuals to become risk seeking. According to Baker & Maner (2009), men become more risk-seeking in the presence of mating cues in order to outrun the competition. Therefore, it is possible that unrestricted individuals will become more risk-seeking in the presence of competition. Future research can test this hypothesis by manipulating the presence of competition, for example in private vs public gambling situations.

The majority of theories on mating tactics suggest that the adoption of these mating strategies depends on environmental factors, and more specifically on resource availability during childhood (Belsky et al., 1991; Chisholm, 1993; 1996; Gangestad & Simpson, 2000). Recent studies show that the exposure to certain environments during childhood sensitize individuals to use specific strategies on reproduction and parental investment all their life (e.g Griskevicius et al., 2013). As a result one could expect that mating tactics is a steady personality trait. However, some studies show that mating tactics can be manipulated (Sundie

et al., 2011; Chen, Zheng & Yan Zhang, 2015). For example in Chen, Zeng and Yan Zhang the authors manipulated short term orientation by asking participants to read a story about a date with a very attractive member of the opposite sex who would never meet again in their lives. The long term condition was about a date that would end up in a long-term relationship. In our studies we measured the tendency to adopt specific mating strategies in a way that is in line with the assumption that mating tactic is a trait variable. Future research could try to replicate our results by manipulating the type of mating tactic. This could be a very useful behavior modification tool in the case that risk-taking behavior leads to loss of welfare.

Our studies used a sexual arousal prime (showing pictures of the opposite gender dressed in a sexually appealing way) to make mating goals salient. The effect of sexual arousal on risk-taking has been studied extensively in the past (Baker & Maner, 2008; Baker & Maner, 2009; Greitemeyer, Kastenmüller & Fischer, 2013; Festjens, Bruyneel & Dewitte, 2014). According to the findings, sexual arousal leads to more risk-taking behavior. However, a recent replication effort brought into question the strength of the effect, suggesting the existence of publication bias (Shanks et al., 2015). Our findings provide some insights to this debate by suggesting that mating tactics can be a potential moderator variable that drives of the effect of sexual arousal on risk-taking behavior in different directions. We suggest that more research should be done in this direction before drawing firm conclusions about the extent of the effect.

Our studies used only male participants as men have been appointed to be the more sensitive gender when it comes to sexual stimuli and risk-taking behavior (Baker & Maner, 2008; Baker & Maner, 2009; Greitemeyer, Kastenmüller & Fischer, 2013). Women have been found to be more risk-averse than men, and it has also been suggested that mating motives do not have an effect on their levels of risk-taking (Baker & Maner, 2008). However, recent findings show that women can be more risk-taking if they are primed with appropriate sexual

cues (Festjens, Bruyneel & Dewitte, 2014). Future research can try to replicate our findings in women in order to clarify whether the effect of mating tactics on risk we find in men is an intra-gender strategy to gain resources or just a way of men to display their mating characteristics to the opposite gender.

Our studies investigated risk-taking behavior in the gain domain. That is, participants had to choose between gambling tasks that provided them with high/low chances of winning a certain amount of money or winning nothing. Future studies can try to extend our findings in the loss domain, where participants could lose an initial endowment should they lose in the game.

Future endeavors can test the effect of mating tactics on other domains of risk-taking behavior (e.g. risky driving behavior) in order to investigate the generalizability of our results in risk-taking behaviors that are not directly linked with financial resources. The tendency for more risk-taking we find in unrestricted sociosexuals might become significant for behaviors more directly linked to immediate reproduction. In risk seeking behaviors more directly linked to reproduction. Furthermore, future research efforts can test the impact of mating tactics on other economic behaviors such as discounting and saving. Providing insights on whether the effect of mating tactics on financial risk-taking can be generalized to other behaviors is important in order to understand the extent of the influence of mating tactics on human behavior.

Why do individuals engage in risk-taking behavior? Taking a more evolutionary perspective, our studies show that risk-taking behavior can be adaptive. It can be influenced by the way people decide to allocate their resources. Specifically, risk-taking can be influenced by the way individuals decide to reproduce. In particular, we find that people willing to invest more time and resources in a romantic relationship engage in less risk-seeking behaviors when mating goals are salient. Our findings contribute to a growing body

of literature arguing that economic behaviors are highly influenced by more fundamental motives in the lives of humans.

GENERAL DISCUSSION

The goal of the present dissertation was to assess the impact of three dual systems, each of which has the distinction between the present and the future as an important theoretical cornerstone, on three important aspects of people's economic behavior: rational choice, conformity and financial risk-taking. We showed that the impact of those systems is not so straightforward. The findings of the three essays suggest that more research is needed to conclude whether some aspects of the dichotomies studied can have a negative or positive impact on behavior.

Essay 1

In the first essay we show that the degree of budget waste resulting from intuitive and cognitive judgments is comparable, but that overall budget waste across the two types of judgments is significantly higher. We conclude that both types of judgments are equally appropriate to make consistent economic decisions. However, a further analysis reveals that the discrepancy between choices made under the influence of intuitive judgments on the one hand and cognitive judgments on the other had a negative impact on overall budget waste.

Our findings provide an answer to the question as to which type of judgment leads to more severe choice inconsistencies. We show that when measuring the severity of inconsistent choices on budget waste, there is no difference in rational choice between the two types of judgment. We also speculate that this null effect might be driven by the inclusion of some additional conditions in our experimental setting (a non-binary choice paradigm and the use of budget constraints and price variation) in comparison with previous studies. Last, we contribute to the literature on affective forecasting errors by showing that the actual dissimilarity in preferences resulting from the two types of judgment can lead to severe inconsistencies which end up in a significant waste of budget from an overall perspective.

Essay 2

In the second essay, we show that the impact of resource scarcity cues on the extent to which people conform to social suggestions depends on childhood background. Resource scarcity cues make people who grew up poor to become more conformists, while they do not have an impact on the tendency to conform for people who grew up rich. Our results suggest that the effect of resource scarcity cues on conformity is the result of an adaptive process. Our findings are consistent with the notion that social learning can be more useful whenever acquiring information through individual learning is difficult (when being raised in poor conditions), whereas individual learning can be more useful in environments where the cost of exploration and experimentation for acquiring information is not so high (when being raised in rich conditions).

We contribute to the literature by showing that the extent to which people get influenced by social norms is moderated by individual differences in the circumstances in which people grew up. We also connect a specific set of life history strategies with conformity. Specifically, we show that fast strategies, traditionally shown to be adopted by people growing up in poor environments, are associated with more compliance with social information.

Essay 3

In the third essay, we show that the extent to which people take risks in financial decisions can be influenced by the type of mating tactics they adopt. We find that when mating goals are salient, people adopting long-term tactics become less risk-taking. There is no significant effect of mating goal salience on financial risk-taking for people adopting short-term mating tactics. Our results suggest that financial risk-taking is linked to more strategic decisions such as the time and effort an individual is willing to invest in a romantic relationship. Our findings are consistent with a nuanced understanding of how humans choose

to acquire resources through either higher or lower risk strategies. Humans can and do follow different sexual strategies. Some individuals follow a low investment strategy by pursuing short-term sexual partners. Other individuals follow a high investment mating strategy by spending more effort, time, and money on a primary mate. Our results show that these differences in turn have an impact on peoples' preferences for how they choose to gain resources.

Future Research

Exploration into the Links between the Different Duals Systems

An important question future research should address is to what extent the three systems we investigated in the present dissertation are similar as constructs. Taking a more careful look at the literature on these three systems reveals similarities in the behavioral outcome of certain poles of these dichotomies. For example, intuitive judgments, fast strategies and short-term mating tactics, apart from their common focus on immediate benefits, were also found to lead to more risk-taking (e.g. Ditto et al., 2006; Griskevicius et al., 2013; Seal & Agostinelly, 1994) and variety seeking (e.g. Geyskens et al., 2007; White et al., 2014; Durante & Arsena, 2014). On the other hand, cognition, slow strategies and long-term mating tactics have been found to be focused on more long-term benefits and lead to less risk-taking and variety seeking.

Additionally, similar aspects of the three dichotomies seem to be triggered by similar cues. For example situational resource scarcity cues has been found to lead to more intuitive judgments (Shah et al., 2012), fast strategies (Griskevicius et al., 2011) and short-term mating strategies (Belsky et al., 1991 although this is debatable). On the other hand, cognitive judgments, slow strategies and long-term tactics were found to be associated with more resource abundance. Some important questions arise. How different are these three dual

paradigms? How strong are the correlations between them? Future endeavors should try to address these important questions. In the next two sections we will provide information on some black spots in the literature which future research can investigate in order to gain more insights in the connections between these three dual-systems.

Life history strategies and Mating tactics

The link between life history strategies and mating tactics is an important topic that needs further clarification as findings seem to be mixed. Mating tactics seem to be a core element of life history theory. According to life history theory, early childhood experiences adaptively channel people to one of two mating tactics. Individuals who are exposed to high levels of stress coming from, for example, inconsistent parenting, economic hardship and harsh physical environments during their childhood tend to develop insecure attachment styles. These individuals get physically and sexually mature earlier than people who were not exposed to high levels of stress during their childhood. Attachment insecurity and early physical maturity subsequently lead to the evolutionary adaptive development of what is called an "opportunistic" reproductive strategy in adulthood (i.e., short-term tactics), as it will lead to higher levels of fitness in high-stress environments (Belsky et al., 1991). Conversely, individuals exposed to lower levels of stress during their childhood tend to develop a more "investing" reproductive strategy in adulthood (i.e., long-term tactics) that it is more fit for low-stress environments (Belsky et al., 1991).

Griskevicius et al. (2011) found that fast strategists tend to reproduce earlier in their lifetime than slow strategists. Early reproduction is found to be characteristic of people adopting short-term mating tactics (Gangestad & Simpson, 1990). Furthermore, according to the results of essay 3, long-term tactics lead to less risk-taking - a behavior consistent with a

slower life-history strategy. As a result, one can conclude that fast strategies are linked with short-term mating tactics while slow strategies are associated with long-term mating tactics.

In direct contrast to life history theory however, Gangestad & Simpson (2000) have proposed strategic pluralism theory. According to the theory, when local environments are harsh and the difficulties of rearing offspring are high, the adaptive need for bi-parental investment increases. Because both genders (i.e., father and mother) are needed to ensure the survival and the development of offspring in more demanding environments, the importance of family investment and fidelity increases. Therefore, Gangestad & Simpson predict that individuals living in harsh environments will adopt more long-term oriented mating tactics. In less harsh environments where bi-parental care is less necessary for rearing offspring, strategic pluralism theory predicts that monogamy would be less prevalent. In cultures with lower stress levels and abundant resources, human psychological adaptations should direct people to more short-term mating tactics. The reason behind this psychological adaptation is that in ancestral environments when bi-parental care was not as crucial, men could afford to channel more of their reproductive effort into short-term mating tactics in order to reap the benefits of such a strategy (i.e., a higher number of offspring). Women also could benefit from short-term mating tactics in such circumstances, as these provided access to high-quality genes, given a reduced dependence on a long-term male's resources (Gangestad, 2001).

In a cross-cultural study, Schmitt (2005) provided evidence supporting strategic pluralism theory. According to the findings of the study, individuals in societies characterized by environmental harshness (which according to life-history theory lead to fast strategies) tend to adopt more long-term mating tactics as expressed by SOI (Sociosexual Orientation Inventory) which focuses on the number sexual partners and the attitude towards uncommitted sex. However, Schmitt's study did not investigated some other aspects of

mating tactics theory such as the energy invested into a romantic relationship and the number of offspring.

Further research is needed to clarify what the precise link is between those two concepts, life history strategies and mating tactics. For example, it might be the case that fast strategists employ some features of short-tacticians (such as investing in a high number of offspring which entails low investment on each offspring) but not some others (such as relying on a high number of mates).

Resource Scarcity and Dual-processing System

Another issue that needs to be clarified is the link between resource scarcity and the dual-processing system. Resource scarcity has been found to harm cognitive function. Mani et al. (2013) found that inducing economic concerns in poor people made them underperform in cognitive control tasks. Some types of resource scarcity such as hunger and time pressure have been used in the literature as manipulations of intuition. Furthermore, resource scarcity has been associated with more impulsive behaviors such as overbuying, saving less and more caloric intake, behaviors that are typically attributed to intuition (Shurtleff, 2009; Briers & Laporte, 2013; Xu, Schwarz & Wyer, 2015). Therefore, one can conclude that resource scarcity cues lead to more intuitive decision making.

However, literature so far has focused only on situational and temporary forms of resource scarcity and has ignored more chronic and severe forms of scarcity which could have more strong and permanent effects on behavior. Therefore, some important questions arise. What is the chronic impact of resource scarcity on people with regard to the use of intuition? Does childhood poverty have an effect on the extent to which individuals rely on their intuition in decision making? Answering those questions will provide insights into what is the exact relationship between life history strategies and the dual-processing system. For

example, showing that childhood poverty makes individuals rely on their intuition more (in their later life) will provide insights in the extent to which fast (slow) strategies can be considered similar to chronic intuitive (cognitive) decision making.

Furthermore, providing more insights in this issue will help researchers and policy-makers to design appropriate interventions in order to alleviate the potential negative influence of resource scarcity on people's behavior. It will also provide useful insights for certain streams of literature. For example, finding that chronic experiences of resource scarcity can make people more sensitive to intuitive reactions can help poverty research. Overreliance to the intuitive decision system might be a potential source of some commonly observed but not clearly explained problems poor people face, such as lack of self-control.

Interaction Effects between the Three Systems

In the previous part we provided some suggestions for future research concerning the interrelations between the three dual systems. However, literature has treated those three systems as different constructs. Taking this perspective, some very interesting topics for future research concerning potential interaction effects between the systems arise.

One promising topic could be an investigation into the potential interaction between intuition and life history strategies. According to life history theory, early life environments stir people to adopt a specific set of strategies. For example, harsh early life environments lead people to adopt fast strategies (e.g. Belsky et al., 1991). According to recent findings, people use these strategies adopted in their childhood only when they feel threatened. Griskevicius et al. (2011) showed that people growing up in harsh (less harsh) environments used fast (slow) strategies when they were primed with mortality cues. It seems that the recruitment of life history strategies is an automatic rather than a deliberate response, as people tend to rely on them in stressful situations, which have been found to trigger less

cognitive and more intuitive reactions (Gillath et al., 2011; Mani et al., 2013). Future research could investigate whether intuitive judgment mode would elicit the use of life history strategies. For instance would people who grew up in poor (rich) environments use fast (slow) strategies when they are hungry or under cognitive load (and thus use their intuition more)? Answering this question could provide more insights into how widespread the use of life history strategies is, and whether we can prevent people from using them in circumstances that lead to disadvantageous decisions making.

Another potentially interesting interaction could be the one between life history strategies and romantic motives. One of the core elements in the life history strategies continuum is the trade-off people face with regards to reproduction. Given the fact that reproduction is an important element of life history strategies, an important question arises. Could mating motives be another potential trigger of the use of life history strategies? Would people who grew up in a poor environment use fast strategies when they are primed with sexual cues? Answering this question would provide insights in how general the use of life history strategies is in people's life, and whether it extends beyond threatening situations.

In essay 3 we show that mating tactics have an impact on decision making when mating motives are salient. In both of the studies we use sexual arousal to manipulate mating motives salience. However, sexual arousal, like other visceral states (e.g hunger, thirst etc.), has been found to trigger more intuitive judgments. Therefore, future endeavors could provide more insights in the interaction between mating tactics and intuitive judgments. Future studies could test whether intuition (primed by cues irrelevant to mating such as cognitive load or hunger) is a general trigger of the impact of mating tactics on people's decisions.

Furthermore, all theories trying to explain why people adopt different mating strategies base their explanation on environmental conditions and more specifically on (chronic) resource availability. Apparently, as mentioned above, there is a link between resource

scarcity and the adoption of different mating strategies (Schmitt, 2005). Future studies could provide more insights in this matter. For example, since the adoption of different mating tactics depends on chronic resource scarcity (similar to life history strategies) imminent resource scarcity could potentially serve as a trigger for the impact of mating tactics on individuals' decision making. Future endeavors could try to replicate the findings of our third essay by using resource scarcity cues instead of mating salience cues to manipulate the use of mating tactics.

Dual System Implications for Conformity and Preference Consistency

The impact of all three dual systems on financial risk-taking (one of the three dependent variables we focused on this dissertation) is known as it has been researched. Ditto et al. (2006) showed that intuition leads to more risk-taking than cognition, Griskevicius et al. (2011) showed that fast strategies lead to more risk-taking than slow strategies and lastly, the results of our third essay indicate that long-term mating tactics might lead to less risky decision. However, the impact of the three dual systems on the other two dependent variables of the dissertation (conformity and preference consistency) is not so clear and needs further investigation.

In the second paper, we showed that life history strategies influence one's tendency to conform. A further investigation into the impact of the other two dual systems studied in this dissertation on conformity might provide novel insights in factors that affect compliance with social influence. In the second paper we argued that people have two main ways to acquire information: individual and social learning (with conformity as a form of social learning). Independent research has shown that using more independent forms of learning requires more slow and deliberative processing (Wheeler, Briño & Hermann, 2007). As a result, one could

expect that intuitive judgments will lead to more social learning, and hence conformity. Future studies could investigate whether intuition leads to more conformism.

Furthermore, literature provides some hints that mating tactics might have an effect on people's tendencies to conform. Griskevicius et al. (2006) showed that mating primes make men (the more socio-sexually unrestricted gender) conform less, while it had the opposite effect on women (the less socio-sexually unrestricted gender). Probst (1999) found that people adopting short-term strategies scored lower on agreeableness than people adopting long-term strategies. Moreover, short-term oriented individuals have been found to acquire partners who are more socially visible, therefore, non-conformity might be an optimal strategy for short-term oriented individuals to attract mates as it will allow them to stand out of the crowd (Probst, 1999). On the other hand, social agreeableness is a characteristic that long-term oriented people seek in their partners, thus, conformity seems to be a good strategy for them to attract mates. Future research can try to provide more insights in this issue.

With regard to preference consistency, the link between the other two dual systems (life history strategies and mating tactics) and consistent decision making is not so clear. Literature has shown that fast life history strategies and short-term mating tactics can lead to more variety seeking than slow life history strategies and long-term mating tactics when it comes to product choices (White et al., 2013; Durante et al., 2014). This more diversified choice behavior can potentially lead to inconsistent choice and loss of budget. Although the connection between fast history strategies, short-term mating tactics and choice inconsistency seems weak, investigating this link further can be an interesting and important future research proposition for several reasons. First, it can provide more evolutionary and thus ultimate explanations of the reasons why individuals make inconsistent decisions. Second, it can potentially provide insights on the circumstances in which choice inconsistency could be adaptive and thus beneficial.

Beyond Current Findings

An important characteristic of the dual-processing system is that the distinction between intuition and cognition is not definite. According to the literature, intuition and cognition do not act in isolation from each other: both are almost always simultaneously active. In some cases intuition puts more weight on the decisions, while in some other instances cognition is mainly responsible for the decisions (Dhar & Gorlin, 2012). However, the majority of the manipulations in the existing literature have treated the distinction as definitive. Almost all published studies have a condition where cognition is prevalent and another condition where intuition prevails. There is no study that tried to investigate how different levels of cognition or intuition can influence behavior. For instance, moderate levels of hunger (and thus prevalence of intuition) could have a different impact on individuals' behavior than high levels of hunger. This would have some interesting implications for the results of the first essay. Different levels of intuition (or cognition) could create different indifference levels between products and this could potentially result in a higher overall budget waste.

The same rationale can be applied for both life history strategies and mating tactics. For both of those concepts the distinction between the two poles is not definite but rather a continuum on which some people tend to score more extreme than others. So for example some fast strategists could adopt faster life-history strategies than others. The same reasoning could be applied to mating tactics. Therefore, it would be interesting to investigate how different adoption levels within the one (or the other) side of the continuums can influence people's behavior. For example future endeavors could investigate whether people who grew up in conditions of extreme poverty adopt faster strategies than people grew up in moderate poverty, and whether this has significantly different behavioral outcomes.

Conclusion

What is the effect of different time orientations on people's economic decision making? Does focusing on the present lead to more disadvantageous decisions than focusing on the future? In the present dissertation we used three different dual systems, all of which rely on this difference between present and future orientation, to provide some answers to those questions. The results of our three essays propose that the effect of different time orientation is more complex and adaptive than the common understanding that present-focus is bad and future focus is invariably good. Present and future orientation can be equally good or bad for people's economic decision making. This impact depends highly on the context of each decision, in combination with several important individual differences. More research is needed to further improve our insights in the environmental factors (current or past) that determine which of the two decisional frames provide the most optimal results.

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Appendix A

ESSAY 2: Regression Results

Study 1

Table 3: Childhood Socio-economic Status Regression Results

	T	p	b	SE
Constant	73.133	0.000	6.933	0.095
SES	-0.124	0.901	-0.007	0.059
Scarcity	0.816	0.415	0.155	0.190
Interaction	-2.972	0.003	-0.355	0.119

Table 4: Current Socio-economic Status Regression Results

	T	p	b	SE
Constant	73.082	0.000	6.947	0.095
SES	0.610	0.541	0.034	0.059
Scarcity	0.760	0.447	0.144	0.190
Interaction	-1.412	0.158	-0.158	0.112

Study 2

Table 5: Childhood Socio-economic Status Regression Results for Positive Rates

	t	p	b	SE
Constant	61.694	0.000	6.925	0.112
SES	-0.971	0.332	-0.059	0.061
Scarcity	-1.117	0.264	-0.251	0.225
Interaction	-3.866	0.000	-0.469	0.121

Table 6: Current Socio-economic Status Regression Results for Positive Rates

	t	p	b	SE
Constant	60.636	0.000	6.927	0.114
SES	-1.368	0.172	-0.076	0.056
Scarcity	-1.029	0.304	-0.235	0.228
Interaction	-0.568	0.568	-0.064	0.113

Table 7: Childhood Socio-economic Status Regression Results for Negative Rates

	t	p	b	SE
Constant	51.746	0.000	5.945	0.115
SES	0.957	0.338	0.063	0.066
Scarcity	-0.634	0.526	-0.146	0.221
Interaction	2.091	0.037	0.276	0.132

Table 8: Current Socio-economic Status Regression Results for Negative Rates

	t	p	b	SE
Constant	51.726	0.000	5.963	0.115
SES	-0.889	0.374	-0.050	0.056
Scarcity	-0,619	0.536	-0.144	0.232
Interaction	0.712	0.477	-0.081	0.114

Study 3

Table 9: Regression Results for income scales

	t	p	b	SE
Constant	874,419	0.000	4.449	0.005
SES	-0,176	0.789	-0.001	0.002
Scarcity	4,113	0.000	0.008	0.002
Interaction	-4.527	0.000	-0.004	0.001

Table 10: Regression Results for income scales and control variables

	t	p	b	SE
Constant	181.212	0.000	4.545	0.025
SES	0.963	0.335	0.002	0.002
Scarcity	3.788	0.002	0.008	0.008
Gender	4.223	0.000	0.041	0.009
Age	-5.248	0.000	-0.002	0.000
Education	-7.411	0.000	-0.016	0.002
Interaction	-4.874	0.000	-0.004	0.001

ESSAY 3: Regression Results

Study 1

Table 10: Regression Results for Tobit model

	t	p	b	SE
Constant	0.17	0.868	0.189	1.137
Sex Cues	-2.30	0.023	-2.197	0.954
SOI	0.23	0.818	0.158	0.685
Interaction	2.60	0.017	0.037	0.037

Study 2

Table 11: Regression Results

	t	p	b	SE
Constant	14.962	0.000	3.336	0.223
Sex Cues	-0.573	0.568	-0.261	0.004
SOI	0.538	0.591	0.002	0.455
Interaction	1.971	0.051	0.015	0.007